

Expploring disease activation functions

In this notebook, we'll look at how changing the disease activation fucntion affects prevalence, heritability, etc.

```
library(tidyverse)
```

```
## -- Attaching packages ----- tidyverse 1.3.2 --
## v ggplot2 3.4.0      v purrr  1.0.1
## v tibble  3.2.1      v dplyr  1.1.2
## v tidyr   1.3.0      v stringr 1.5.0
## v readr   2.1.3      v forcats 0.5.2
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
```

```
library(MASS)
```

```
##
## Attaching package: 'MASS'
##
## The following object is masked from 'package:dplyr':
##
##     select
```

```
library(fastmatrix)
library(tidyverse)
library(matlib)
```

```
##
## Attaching package: 'matlib'
##
## The following object is masked from 'package:fastmatrix':
##
##     vec
```

```
simulate_genotypes <- function(N,L){
  ### function to simulate genotypes
  ps <- rbeta(n = L,4,4)
  G <- matrix(NA,nrow=N,ncol=L)
  for (i in c(1:L)){
    gen <- rbinom(N, size = 2, prob = ps[i])
    G[,i] <- gen
  }
  return(G)
}
```

```

}

give_disease_risk <- function(nodes,f=mean,threshold=5){
  # returns disease risk/severity
  # risk given by some function of the nodes
  risk <- f(nodes)
  return(risk)
}

# a more funky disease function
mdd_risk <- function(v,threshold=1,n=3){
  # linear combination of node activation - this is just an example
  return(sum(v > threshold)>n)
}

greml <- function( y, G, constrain=F, quantnorm=F ){
  if( quantnorm ){
    ranks <- rank(y)
    quantiles <- qnorm(ranks/(length(ranks) + 1))
    y <- quantiles
  }
  y <- scale(y)
  G <- scale(G)
  N <- nrow(G)
  svdG <- svd(G)
  out <- eigen_lmm( yprime=t(svdG$u) %*% y, Lam.K=(svdG$d/sqrt(N)+1e-12)^2, constrained=constrain )
  sig2g <- out$sig2g
  sig2e <- out$sig2e
  list( h2=sig2g/(sig2g+sig2e), sig2g=sig2g, sig2e=sig2e )
}

eigen_lmm <- function( yprime, Lam.K, constrained = TRUE) {
  if (constrained) {
    delta <-
      optimise(
        eigen_lmm_obj,
        c(0, 1e5),
        maximum = TRUE,
        Lam.K = Lam.K,
        yprime = yprime
      )$maximum
  } else {
    ### these parameters correspond to h^2>0, with h^2>1 for delta<0
    opt_lims_plus <- c(-min(Lam.K), 1e5)
    opt_plus <-
      optimise(
        eigen_lmm_obj,
        opt_lims_plus,
        maximum = TRUE,
        Lam.K = Lam.K,
        yprime = yprime
      )
  }
}

```

```

### these parameters correspond to  $h^2 < 0$ 
opt_lims_minus <- c(-1000, -max(Lam.K))
opt_minus <-
  optimise(
    eigen_lmm_obj,
    opt_lims_minus,
    maximum = TRUE,
    Lam.K = Lam.K,
    yprime = yprime
  )
delta <-
  ifelse(opt_plus$objective > opt_minus$objective,
    opt_plus$maximum,
    opt_minus$maximum)
}
sig2g <- mean(yprime ^ 2 / (Lam.K + delta))
sig2e <- delta * sig2g
list(h2 = sig2g / (sig2g + sig2e),
  sig2g = sig2g,
  sig2e = sig2e)
}

eigen_lmm_obj <- function(delta, yprime, Lam.K){
  denominator <- Lam.K + delta
  sig2g <- mean(yprime^2/denominator)
  sum(dnorm( yprime, mean=0, sd=sqrt(sig2g*denominator), log=TRUE ))}

sig_from_row <- function(ind.sig,i,n_node){
  ## function which takes the matrix of individ. level sigmas and builds a covariance matrix which we c

  # extract relevant row
  sig_vec <- ind.sig[i,]

  # make into matrix
  sig_mat <- matrix(0,n_node,n_node)
  sig_mat[lower.tri(sig_mat,diag=TRUE)] <- sig_vec
  sig_mat[upper.tri(sig_mat)] <- t(sig_mat)[upper.tri(sig_mat)]

  # how to build diagonal? Here I will add the environmental variances
  #diag(sig_mat) <- diag(S$Sigma) + diag(sig_mat)

  return(sig_mat)
}

theme_set(theme_bw())

l <- 200 # number of loci
N <- 1000 # number of individuals
P <- 1 # number of symptoms
h2 <- 0.9
reps <- 10

```

```
heritabilities <- seq(0,1,0.2)
```

Null model: MDD is a function of symptoms, symptoms are IID

```
G <- simulate_genotypes(N = N,L = 1)
G <- scale(G)
beta <- matrix(rnorm(P * 1),nrow=1) %%% diag(1,P,P) * sqrt(h2 / 1)
e <- matrix(rnorm(P * N),nrow=N) * sqrt(1-h2)

X <- G %%% beta + e
cov(e)
```

```
##           [,1]
## [1,] 0.1032848
```

```
cov(G %%% beta)
```

```
##           [,1]
## [1,] 0.9575604
```

```
cov(X)
```

```
##           [,1]
## [1,] 1.052119
```

```
greml(X[,1],G)
```

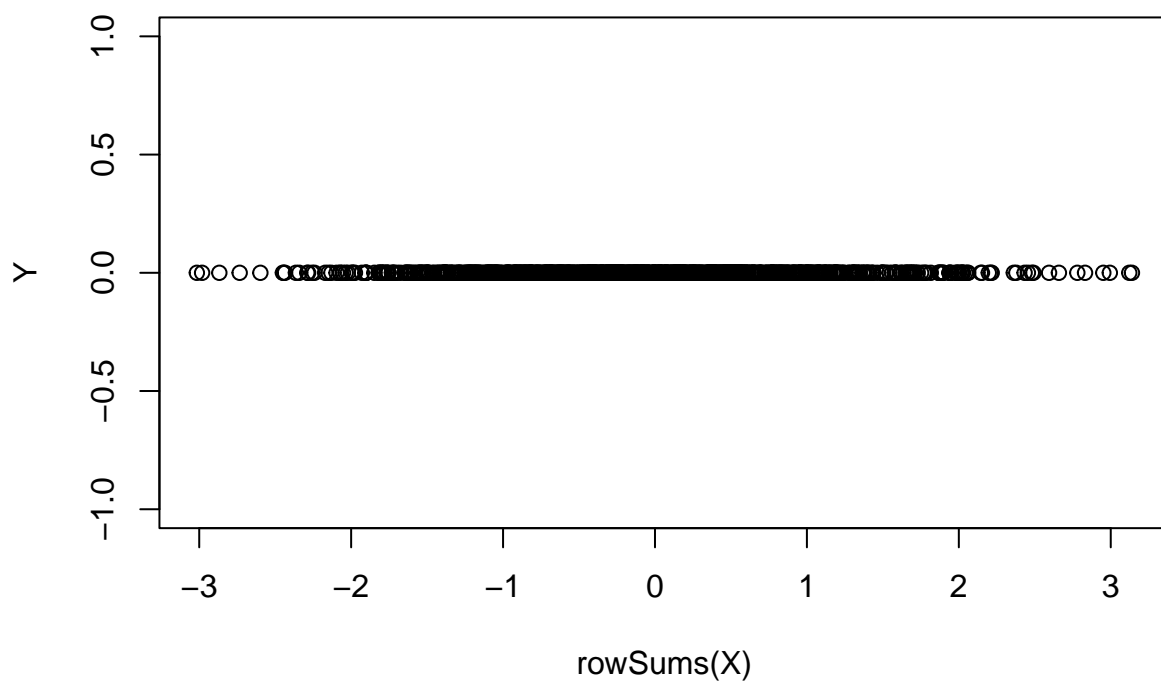
```
## $h2
## [1] 1.003312
##
## $sig2g
## [1] 4.607367
##
## $sig2e
## [1] -0.01520974
```

```
Y <- apply(X,1,mdd_risk,threshold=0)
greml(Y,G)
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
rows <- data.frame()

for (r in c(1:reps)){
  print(r)
  for (her in heritabilities){

    G <- simulate_genotypes(N = N,L = 1)
    G <- scale(G)
    beta <- matrix(rnorm(P * 1),nrow=1) %*% diag(1,P,P) * sqrt(her / 1)
    e <- matrix(rnorm(P * N),nrow=N) * sqrt(1-her)

    X <- G %*% beta + e
    Y <- apply(X,1,mdd_risk,threshold=0.5,n=0)

    res <- greml(Y,G)
    h2 <- res$h2

    rows <- rbind(rows,data.frame("h2_symptoms"=her,
                                  "h2_disease"=h2,
                                  "sig2g"=res$sig2g,
                                  "sig2e"=res$sig2e,
                                  "prev"=sum(Y),
                                  "rep"=r))

  }
}
```

```
}
```

```
## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10
```

```
rows
```

| ## | h2_symptoms | h2_disease | sig2g | sig2e | prev | rep |
|-------|-------------|-------------|-------------|-------------|------|-----|
| ## 1 | 0.0 | -0.35728112 | -0.38371147 | 1.45768781 | 319 | 1 |
| ## 2 | 0.2 | 0.65181650 | 0.99715799 | 0.53265598 | 315 | 1 |
| ## 3 | 0.4 | 0.55372919 | 1.05544737 | 0.85062404 | 304 | 1 |
| ## 4 | 0.6 | 0.43974877 | 1.05998729 | 1.35045106 | 302 | 1 |
| ## 5 | 0.8 | 0.67036281 | 1.93026432 | 0.94916797 | 322 | 1 |
| ## 6 | 1.0 | 0.09691226 | 0.31743756 | 2.95807746 | 299 | 1 |
| ## 7 | 0.0 | -0.21522936 | -0.18625633 | 1.05164169 | 314 | 2 |
| ## 8 | 0.2 | 0.69241252 | 0.94911010 | 0.42161917 | 315 | 2 |
| ## 9 | 0.4 | 0.44982979 | 0.89153223 | 1.09040016 | 291 | 2 |
| ## 10 | 0.6 | 0.70112909 | 1.63879856 | 0.69857211 | 306 | 2 |
| ## 11 | 0.8 | 0.71126380 | 2.04881398 | 0.83171218 | 315 | 2 |
| ## 12 | 1.0 | 0.83431602 | 2.68014134 | 0.53224014 | 324 | 2 |
| ## 13 | 0.0 | 0.01813933 | 0.01860537 | 1.00708666 | 301 | 3 |
| ## 14 | 0.2 | 0.18768029 | 0.29786563 | 1.28922499 | 320 | 3 |
| ## 15 | 0.4 | 0.74998481 | 1.41053658 | 0.47021695 | 321 | 3 |
| ## 16 | 0.6 | 0.46124579 | 1.04018761 | 1.21498226 | 304 | 3 |
| ## 17 | 0.8 | 0.88422848 | 2.50527730 | 0.32801449 | 307 | 3 |
| ## 18 | 1.0 | 0.80055843 | 2.65868937 | 0.66235413 | 299 | 3 |
| ## 19 | 0.0 | -0.02989756 | -0.02897099 | 0.99797951 | 293 | 4 |
| ## 20 | 0.2 | 0.76864443 | 1.19873106 | 0.36080807 | 303 | 4 |
| ## 21 | 0.4 | 0.13497156 | 0.23972464 | 1.53638768 | 301 | 4 |
| ## 22 | 0.6 | 0.58591529 | 1.29657155 | 0.91632779 | 301 | 4 |
| ## 23 | 0.8 | 0.83849310 | 2.43352521 | 0.46873506 | 297 | 4 |
| ## 24 | 1.0 | 0.68260306 | 2.35000541 | 1.09270612 | 311 | 4 |
| ## 25 | 0.0 | 0.11296226 | 0.10576150 | 0.83049370 | 328 | 5 |
| ## 26 | 0.2 | 0.80691164 | 1.23661484 | 0.29591336 | 329 | 5 |
| ## 27 | 0.4 | 0.63604604 | 1.25199503 | 0.71640812 | 309 | 5 |
| ## 28 | 0.6 | 0.89413834 | 2.22198802 | 0.26307265 | 309 | 5 |
| ## 29 | 0.8 | 0.80677771 | 2.54537990 | 0.60961540 | 328 | 5 |
| ## 30 | 1.0 | 1.08070693 | 3.59172879 | -0.26822942 | 299 | 5 |
| ## 31 | 0.0 | -0.39618061 | -0.46618444 | 1.64288121 | 310 | 6 |
| ## 32 | 0.2 | 0.32869351 | 0.47083219 | 0.96160313 | 326 | 6 |
| ## 33 | 0.4 | 0.50905720 | 0.85518726 | 0.82475608 | 304 | 6 |
| ## 34 | 0.6 | 0.97121189 | 2.16490412 | 0.06417085 | 306 | 6 |
| ## 35 | 0.8 | 0.88027970 | 2.59724828 | 0.35323243 | 324 | 6 |
| ## 36 | 1.0 | 0.94894561 | 3.14036195 | 0.16895515 | 302 | 6 |
| ## 37 | 0.0 | 0.02059417 | 0.01748776 | 0.83167314 | 328 | 7 |

| | | | | | | |
|-------|-----|-------------|-------------|-------------|-----|----|
| ## 38 | 0.2 | 0.02628194 | 0.03519926 | 1.30409541 | 305 | 7 |
| ## 39 | 0.4 | 0.50017435 | 0.86354504 | 0.86294302 | 318 | 7 |
| ## 40 | 0.6 | 0.86757129 | 2.04026660 | 0.31143249 | 321 | 7 |
| ## 41 | 0.8 | 0.44114698 | 1.25413172 | 1.58875689 | 302 | 7 |
| ## 42 | 1.0 | 1.19275793 | 4.15391543 | -0.67130145 | 324 | 7 |
| ## 43 | 0.0 | -0.01361768 | -0.01397719 | 1.04037748 | 318 | 8 |
| ## 44 | 0.2 | 0.53366458 | 0.78293507 | 0.68415700 | 310 | 8 |
| ## 45 | 0.4 | 0.52361441 | 0.97568480 | 0.88768025 | 303 | 8 |
| ## 46 | 0.6 | 0.55663810 | 1.22001274 | 0.97173938 | 307 | 8 |
| ## 47 | 0.8 | 0.70628564 | 1.92194568 | 0.79925602 | 294 | 8 |
| ## 48 | 1.0 | 0.66678997 | 2.24271111 | 1.12073348 | 327 | 8 |
| ## 49 | 0.0 | -0.02552044 | -0.02544340 | 1.02242499 | 315 | 9 |
| ## 50 | 0.2 | 0.53955907 | 0.81822101 | 0.69824133 | 298 | 9 |
| ## 51 | 0.4 | 0.85040660 | 1.59856290 | 0.28120016 | 301 | 9 |
| ## 52 | 0.6 | 0.79992050 | 1.95015294 | 0.48778049 | 305 | 9 |
| ## 53 | 0.8 | 0.87750689 | 2.33876378 | 0.32647315 | 291 | 9 |
| ## 54 | 1.0 | 0.87959870 | 2.83594064 | 0.38818946 | 305 | 9 |
| ## 55 | 0.0 | -0.06991765 | -0.07478485 | 1.14439826 | 322 | 10 |
| ## 56 | 0.2 | 0.49375614 | 0.74708612 | 0.76598087 | 305 | 10 |
| ## 57 | 0.4 | 0.45786957 | 0.90705544 | 1.07397913 | 337 | 10 |
| ## 58 | 0.6 | 0.66834672 | 1.48050297 | 0.73466908 | 346 | 10 |
| ## 59 | 0.8 | 0.75391913 | 2.17846082 | 0.71105442 | 303 | 10 |
| ## 60 | 1.0 | 0.49425894 | 1.54729101 | 1.58323612 | 269 | 10 |

```

rows <- data.frame()
reps <- 10
nsymp <- 5

for (r in c(1:reps)){
  print(r)
  for (her in heritabilities){
    for (p in c(1:nsymp)){

      G <- simulate_genotypes(N = N,L = 1)
      G <- scale(G)
      beta <- matrix(rnorm(p * 1),nrow=1) %*% diag(1,p,p) * sqrt(her / 1)
      e <- matrix(rnorm(p * N),nrow=N) * sqrt(1-her)

      X <- G %*% beta + e

      c <- 1
      Y <- apply(X,1,mdd_risk,threshold=c,n=p-1)
      prev <- sum(Y)/N

      while (prev<0.25){
        c <- c - 0.1
        Y <- apply(X,1,mdd_risk,threshold=c,n=p-1)
        prev <- sum(Y)/N
      }

      res <- greml(Y,G)
      h2 <- res$h2

      rows <- rbind(rows,data.frame("h2_symptoms"=her,

```

```

    "h2_disease"=h2,
    "sig2g"=res$sig2g,
    "sig2e"=res$sig2e,
    "prev"=sum(Y),
    "rep"=r,
    "P"=p,
    "c"=c))
  }
}
}

```

```

## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10

```

```
rows
```

| ## | h2_symptoms | h2_disease | sig2g | sig2e | prev | rep | P |
|-------|-------------|---------------|---------------|--------------|------|-----|---|
| ## 1 | 0.0 | -0.1993361853 | -0.1906523668 | 1.147088683 | 279 | 1 | 1 |
| ## 2 | 0.0 | -0.2770325997 | -0.3119991399 | 1.438217282 | 274 | 1 | 2 |
| ## 3 | 0.0 | 0.1390863797 | 0.1496845252 | 0.926513774 | 274 | 1 | 3 |
| ## 4 | 0.0 | 0.1546095789 | 0.1702543557 | 0.930934567 | 295 | 1 | 4 |
| ## 5 | 0.0 | 0.0091618398 | 0.0091181458 | 0.986112726 | 250 | 1 | 5 |
| ## 6 | 0.2 | 0.0680370503 | 0.0851643513 | 1.166570563 | 275 | 1 | 1 |
| ## 7 | 0.2 | 0.5136039448 | 0.6814537578 | 0.645354116 | 262 | 1 | 2 |
| ## 8 | 0.2 | 0.1309989126 | 0.1583655987 | 1.050542136 | 282 | 1 | 3 |
| ## 9 | 0.2 | 0.3071231259 | 0.3682378607 | 0.830753129 | 286 | 1 | 4 |
| ## 10 | 0.2 | 0.4188893341 | 0.5347320753 | 0.741815289 | 279 | 1 | 5 |
| ## 11 | 0.4 | 0.6510587679 | 1.3822865515 | 0.740849822 | 277 | 1 | 1 |
| ## 12 | 0.4 | 0.3036482576 | 0.5660865529 | 1.298197330 | 277 | 1 | 2 |
| ## 13 | 0.4 | 0.0029593526 | 0.0047633742 | 1.604836715 | 264 | 1 | 3 |
| ## 14 | 0.4 | 0.4757528214 | 0.7005333207 | 0.771939966 | 274 | 1 | 4 |
| ## 15 | 0.4 | 0.7755125919 | 1.2196389024 | 0.353048524 | 302 | 1 | 5 |
| ## 16 | 0.6 | 1.0188722229 | 2.6316618769 | -0.048745376 | 279 | 1 | 1 |
| ## 17 | 0.6 | 0.7649943385 | 1.5553359865 | 0.477797997 | 276 | 1 | 2 |
| ## 18 | 0.6 | 0.9896519425 | 1.7791363299 | 0.018603111 | 257 | 1 | 3 |
| ## 19 | 0.6 | 0.4384832795 | 0.7615741621 | 0.975263245 | 281 | 1 | 4 |
| ## 20 | 0.6 | 0.6601285011 | 1.1440499748 | 0.589021651 | 297 | 1 | 5 |
| ## 21 | 0.8 | 0.6934705028 | 1.8938233923 | 0.837112364 | 274 | 1 | 1 |
| ## 22 | 0.8 | 0.6326477151 | 1.4400495904 | 0.836177061 | 252 | 1 | 2 |
| ## 23 | 0.8 | 0.1200691269 | 0.2787576515 | 2.042885379 | 289 | 1 | 3 |
| ## 24 | 0.8 | 0.9177181225 | 1.9902174464 | 0.178441315 | 266 | 1 | 4 |
| ## 25 | 0.8 | 0.6400325228 | 1.2312519362 | 0.692481456 | 261 | 1 | 5 |
| ## 26 | 1.0 | 1.0780875683 | 3.3973412880 | -0.246074742 | 265 | 1 | 1 |
| ## 27 | 1.0 | 0.3984526939 | 1.0679830130 | 1.612342730 | 254 | 1 | 2 |
| ## 28 | 1.0 | 0.9836204408 | 2.2235047359 | 0.037026505 | 268 | 1 | 3 |

| | | | | | | |
|-------|-----|---------------|---------------|--------------|-----|-----|
| ## 29 | 1.0 | 0.7406439866 | 1.6735813361 | 0.586048616 | 283 | 1 4 |
| ## 30 | 1.0 | 1.0404632040 | 2.5548797913 | -0.099358268 | 311 | 1 5 |
| ## 31 | 0.0 | 0.2818448618 | 0.2905777560 | 0.740407000 | 264 | 2 1 |
| ## 32 | 0.0 | -0.3176966625 | -0.2960262054 | 1.227815048 | 250 | 2 2 |
| ## 33 | 0.0 | -0.0997091246 | -0.0994287599 | 1.096616933 | 250 | 2 3 |
| ## 34 | 0.0 | 0.1982674009 | 0.2624599681 | 1.061307666 | 268 | 2 4 |
| ## 35 | 0.0 | 0.0952154392 | 0.0921021732 | 0.875200756 | 270 | 2 5 |
| ## 36 | 0.2 | 0.1875706819 | 0.2636115759 | 1.141787035 | 257 | 2 1 |
| ## 37 | 0.2 | 0.4740898037 | 0.6539582581 | 0.725439175 | 269 | 2 2 |
| ## 38 | 0.2 | -0.0029970232 | -0.0041643708 | 1.393666743 | 284 | 2 3 |
| ## 39 | 0.2 | -0.3983830046 | -0.4035902494 | 1.416661201 | 268 | 2 4 |
| ## 40 | 0.2 | 0.5089584689 | 0.6059301285 | 0.584599483 | 285 | 2 5 |
| ## 41 | 0.4 | 0.3797899388 | 0.6211200444 | 1.014310442 | 262 | 2 1 |
| ## 42 | 0.4 | 0.3959856453 | 0.6222258555 | 0.949108517 | 273 | 2 2 |
| ## 43 | 0.4 | 0.4408088258 | 0.7122258610 | 0.903499186 | 299 | 2 3 |
| ## 44 | 0.4 | 0.2515975037 | 0.3267932868 | 0.972080040 | 275 | 2 4 |
| ## 45 | 0.4 | 0.3721040428 | 0.5271353998 | 0.889499034 | 275 | 2 5 |
| ## 46 | 0.6 | 0.7389222433 | 1.5189082074 | 0.536664244 | 266 | 2 1 |
| ## 47 | 0.6 | 0.5140914046 | 1.1228565902 | 1.061300897 | 294 | 2 2 |
| ## 48 | 0.6 | 0.9961650988 | 2.1121041750 | 0.008130892 | 254 | 2 3 |
| ## 49 | 0.6 | 0.3939879416 | 0.6288782445 | 0.967308283 | 258 | 2 4 |
| ## 50 | 0.6 | 0.1881748171 | 0.3639206242 | 1.570029039 | 270 | 2 5 |
| ## 51 | 0.8 | 0.8631745364 | 2.3804972525 | 0.377342735 | 272 | 2 1 |
| ## 52 | 0.8 | 0.9979245577 | 2.3535861601 | 0.004894891 | 253 | 2 2 |
| ## 53 | 0.8 | 0.7654755432 | 1.7137127611 | 0.525042972 | 274 | 2 3 |
| ## 54 | 0.8 | 0.8040611294 | 1.5598430398 | 0.380112746 | 278 | 2 4 |
| ## 55 | 0.8 | 0.4507349261 | 0.8338883729 | 1.016175433 | 256 | 2 5 |
| ## 56 | 1.0 | 0.6887698230 | 2.1613522718 | 0.976636937 | 288 | 2 1 |
| ## 57 | 1.0 | 0.4681029745 | 1.3240661295 | 1.504512627 | 256 | 2 2 |
| ## 58 | 1.0 | 0.5789020804 | 1.3902418452 | 1.011272836 | 259 | 2 3 |
| ## 59 | 1.0 | 0.9332563597 | 2.0195689462 | 0.144433394 | 261 | 2 4 |
| ## 60 | 1.0 | 0.6998066768 | 1.5513476783 | 0.665475524 | 257 | 2 5 |
| ## 61 | 0.0 | 0.0107962159 | 0.0111703578 | 1.023484554 | 258 | 3 1 |
| ## 62 | 0.0 | -0.1737059514 | -0.1875724770 | 1.267400056 | 250 | 3 2 |
| ## 63 | 0.0 | -0.0453656710 | -0.0442357857 | 1.019329610 | 282 | 3 3 |
| ## 64 | 0.0 | 0.0582040884 | 0.0546694265 | 0.884601818 | 293 | 3 4 |
| ## 65 | 0.0 | 0.2326136712 | 0.2247925681 | 0.741584717 | 293 | 3 5 |
| ## 66 | 0.2 | 0.6585528505 | 0.9559562859 | 0.495645184 | 263 | 3 1 |
| ## 67 | 0.2 | 0.0976859085 | 0.1250024477 | 1.154633987 | 256 | 3 2 |
| ## 68 | 0.2 | 0.2109769421 | 0.2815449054 | 1.052936970 | 276 | 3 3 |
| ## 69 | 0.2 | 0.0894429293 | 0.1225977468 | 1.248083511 | 276 | 3 4 |
| ## 70 | 0.2 | 0.1433822685 | 0.1593088582 | 0.951768961 | 304 | 3 5 |
| ## 71 | 0.4 | 0.6488266221 | 1.2409860084 | 0.671675966 | 277 | 3 1 |
| ## 72 | 0.4 | 0.3458684932 | 0.5516003897 | 1.043226547 | 250 | 3 2 |
| ## 73 | 0.4 | 0.3375582492 | 0.4596833658 | 0.902106390 | 286 | 3 3 |
| ## 74 | 0.4 | 0.1801614598 | 0.2593442637 | 1.180165962 | 298 | 3 4 |
| ## 75 | 0.4 | 0.5691530045 | 0.8851639862 | 0.670066293 | 266 | 3 5 |
| ## 76 | 0.6 | 0.3651003296 | 0.8309445014 | 1.444990177 | 259 | 3 1 |
| ## 77 | 0.6 | 0.8853480111 | 1.7602616547 | 0.227952734 | 267 | 3 2 |
| ## 78 | 0.6 | 0.5194760567 | 0.9216944754 | 0.852582632 | 281 | 3 3 |
| ## 79 | 0.6 | 0.5734614732 | 1.0475534072 | 0.779166357 | 300 | 3 4 |
| ## 80 | 0.6 | 0.2156265578 | 0.3619354900 | 1.316593786 | 253 | 3 5 |
| ## 81 | 0.8 | 0.9446905151 | 2.6613148438 | 0.155813942 | 269 | 3 1 |
| ## 82 | 0.8 | 0.7710312171 | 1.7975782980 | 0.533816668 | 289 | 3 2 |

| | | | | | | |
|--------|-----|---------------|---------------|--------------|-----|-----|
| ## 83 | 0.8 | 0.8118603745 | 1.7674910549 | 0.409596423 | 294 | 3 3 |
| ## 84 | 0.8 | 0.6170553135 | 1.2579103828 | 0.780659508 | 287 | 3 4 |
| ## 85 | 0.8 | 0.5562418614 | 1.0977851540 | 0.875790066 | 298 | 3 5 |
| ## 86 | 1.0 | 0.8484297900 | 2.6897145044 | 0.480511878 | 253 | 3 1 |
| ## 87 | 1.0 | 0.9205049873 | 2.3741730319 | 0.205034104 | 251 | 3 2 |
| ## 88 | 1.0 | 0.8970401316 | 2.3223336824 | 0.266551252 | 298 | 3 3 |
| ## 89 | 1.0 | 0.8135744574 | 1.8188620857 | 0.416780970 | 284 | 3 4 |
| ## 90 | 1.0 | 0.3903376140 | 0.8843826296 | 1.381303786 | 253 | 3 5 |
| ## 91 | 0.0 | -0.1460321657 | -0.1455781121 | 1.142468841 | 259 | 4 1 |
| ## 92 | 0.0 | 0.2083589418 | 0.2172785956 | 0.825530481 | 251 | 4 2 |
| ## 93 | 0.0 | 0.0409953054 | 0.0414798395 | 0.970339419 | 283 | 4 3 |
| ## 94 | 0.0 | 0.2205596159 | 0.2438732967 | 0.861829103 | 267 | 4 4 |
| ## 95 | 0.0 | 0.0631438202 | 0.0552117065 | 0.819168498 | 257 | 4 5 |
| ## 96 | 0.2 | 0.8489815823 | 1.1748352609 | 0.208981874 | 276 | 4 1 |
| ## 97 | 0.2 | 0.4582694670 | 0.7000802823 | 0.827580478 | 261 | 4 2 |
| ## 98 | 0.2 | 0.3901785839 | 0.4905259384 | 0.766657205 | 266 | 4 3 |
| ## 99 | 0.2 | 0.2629085770 | 0.3384651024 | 0.948921967 | 255 | 4 4 |
| ## 100 | 0.2 | 0.1421579830 | 0.2142613864 | 1.292944765 | 252 | 4 5 |
| ## 101 | 0.4 | 0.6239094253 | 1.1407807726 | 0.687658944 | 286 | 4 1 |
| ## 102 | 0.4 | 0.5811375364 | 1.1386409381 | 0.820690316 | 284 | 4 2 |
| ## 103 | 0.4 | -0.1121877352 | -0.1653283806 | 1.639004449 | 271 | 4 3 |
| ## 104 | 0.4 | 0.1574100224 | 0.2453609301 | 1.313376731 | 254 | 4 4 |
| ## 105 | 0.4 | 0.7141414239 | 1.1002882361 | 0.440426529 | 271 | 4 5 |
| ## 106 | 0.6 | 0.7945189646 | 1.7227725763 | 0.445548953 | 278 | 4 1 |
| ## 107 | 0.6 | 0.8087593509 | 1.6742933858 | 0.395906339 | 274 | 4 2 |
| ## 108 | 0.6 | 1.0215837366 | 1.8308337549 | -0.038681346 | 289 | 4 3 |
| ## 109 | 0.6 | 0.6197151934 | 1.1182654860 | 0.686217441 | 277 | 4 4 |
| ## 110 | 0.6 | 0.6429427780 | 1.0618877611 | 0.589717634 | 284 | 4 5 |
| ## 111 | 0.8 | 1.0581344544 | 2.8548391526 | -0.156846340 | 263 | 4 1 |
| ## 112 | 0.8 | 0.7244698777 | 1.8020744828 | 0.685364317 | 269 | 4 2 |
| ## 113 | 0.8 | 0.2988072062 | 0.6602170149 | 1.549291328 | 251 | 4 3 |
| ## 114 | 0.8 | 0.5109251950 | 0.9874048051 | 0.945177136 | 277 | 4 4 |
| ## 115 | 0.8 | 0.4985063278 | 0.9291735967 | 0.934741754 | 278 | 4 5 |
| ## 116 | 1.0 | 0.8252217968 | 2.7255268756 | 0.577254129 | 272 | 4 1 |
| ## 117 | 1.0 | 0.6144451671 | 1.6513951788 | 1.036224917 | 254 | 4 2 |
| ## 118 | 1.0 | 1.2035473244 | 2.8659165951 | -0.484691913 | 277 | 4 3 |
| ## 119 | 1.0 | 0.6796755625 | 1.6618098164 | 0.783194695 | 289 | 4 4 |
| ## 120 | 1.0 | 0.7529240594 | 1.7747148099 | 0.582381882 | 266 | 4 5 |
| ## 121 | 0.0 | -0.0732032799 | -0.0691746221 | 1.014140780 | 268 | 5 1 |
| ## 122 | 0.0 | 0.4500933960 | 0.4069127598 | 0.497150182 | 265 | 5 2 |
| ## 123 | 0.0 | 0.0717427435 | 0.0722371492 | 0.934654220 | 287 | 5 3 |
| ## 124 | 0.0 | -0.1419136496 | -0.1561128062 | 1.256167710 | 287 | 5 4 |
| ## 125 | 0.0 | -0.1169208633 | -0.0819695632 | 0.783038310 | 289 | 5 5 |
| ## 126 | 0.2 | 0.6259690319 | 0.9299326393 | 0.555656251 | 262 | 5 1 |
| ## 127 | 0.2 | 0.4418502757 | 0.6249632129 | 0.789459833 | 257 | 5 2 |
| ## 128 | 0.2 | 0.2844035058 | 0.3423458910 | 0.861387129 | 293 | 5 3 |
| ## 129 | 0.2 | 0.1262164458 | 0.1574082528 | 1.089721246 | 260 | 5 4 |
| ## 130 | 0.2 | -0.0466655293 | -0.0593926320 | 1.332122910 | 250 | 5 5 |
| ## 131 | 0.4 | 0.4531526257 | 0.8265325773 | 0.997428116 | 282 | 5 1 |
| ## 132 | 0.4 | 0.3914929151 | 0.6084860927 | 0.945784928 | 287 | 5 2 |
| ## 133 | 0.4 | 0.4882993720 | 0.7181356246 | 0.752551552 | 251 | 5 3 |
| ## 134 | 0.4 | 0.6816641887 | 1.1083471424 | 0.517595896 | 271 | 5 4 |
| ## 135 | 0.4 | 0.3754389125 | 0.5403678406 | 0.898928467 | 307 | 5 5 |
| ## 136 | 0.6 | 1.1215642826 | 2.4203230731 | -0.262334351 | 261 | 5 1 |

| | | | | | | |
|--------|-----|---------------|---------------|--------------|-----|-----|
| ## 137 | 0.6 | 0.8873970757 | 1.7584329981 | 0.223129761 | 275 | 5 2 |
| ## 138 | 0.6 | 0.6640074051 | 1.2734009733 | 0.644350190 | 252 | 5 3 |
| ## 139 | 0.6 | -0.0446872922 | -0.0801387040 | 1.873460701 | 256 | 5 4 |
| ## 140 | 0.6 | 0.8004017884 | 1.3284238094 | 0.331272394 | 274 | 5 5 |
| ## 141 | 0.8 | 1.1136283574 | 3.1497191600 | -0.321379581 | 263 | 5 1 |
| ## 142 | 0.8 | 0.8361469117 | 1.9794446620 | 0.387896094 | 281 | 5 2 |
| ## 143 | 0.8 | 0.7623581335 | 1.7387599812 | 0.542005324 | 272 | 5 3 |
| ## 144 | 0.8 | 0.4255070613 | 0.8302448002 | 1.120944441 | 265 | 5 4 |
| ## 145 | 0.8 | 0.2618951119 | 0.4456500872 | 1.255985671 | 280 | 5 5 |
| ## 146 | 1.0 | 0.9005726065 | 2.9359629634 | 0.324143931 | 257 | 5 1 |
| ## 147 | 1.0 | 0.8345325258 | 2.1807447154 | 0.432388563 | 260 | 5 2 |
| ## 148 | 1.0 | 0.8833092504 | 2.1488988813 | 0.283883160 | 295 | 5 3 |
| ## 149 | 1.0 | 0.7478367998 | 1.6061882017 | 0.541590835 | 253 | 5 4 |
| ## 150 | 1.0 | 0.4052603979 | 0.8575169331 | 1.258448351 | 294 | 5 5 |
| ## 151 | 0.0 | -0.2079604172 | -0.2136834524 | 1.241203282 | 257 | 6 1 |
| ## 152 | 0.0 | 0.3528611083 | 0.3024723940 | 0.554727187 | 273 | 6 2 |
| ## 153 | 0.0 | -0.0135742364 | -0.0116809324 | 0.872203179 | 277 | 6 3 |
| ## 154 | 0.0 | 0.1529048316 | 0.1461687213 | 0.809777011 | 261 | 6 4 |
| ## 155 | 0.0 | 0.3192007234 | 0.3485262770 | 0.743345550 | 253 | 6 5 |
| ## 156 | 0.2 | 0.2303227302 | 0.3133860764 | 1.047252868 | 277 | 6 1 |
| ## 157 | 0.2 | 0.4497154725 | 0.6580390240 | 0.805195097 | 253 | 6 2 |
| ## 158 | 0.2 | 0.2298859620 | 0.2946390642 | 0.987035822 | 273 | 6 3 |
| ## 159 | 0.2 | 0.4127787505 | 0.5922246785 | 0.842501983 | 286 | 6 4 |
| ## 160 | 0.2 | 0.2546931187 | 0.2830310731 | 0.828232060 | 303 | 6 5 |
| ## 161 | 0.4 | 0.7726385136 | 1.4691432029 | 0.432319353 | 279 | 6 1 |
| ## 162 | 0.4 | 0.4646740497 | 0.7106508313 | 0.818702555 | 279 | 6 2 |
| ## 163 | 0.4 | 0.2566028088 | 0.3805535075 | 1.102491473 | 265 | 6 3 |
| ## 164 | 0.4 | 0.8171930898 | 1.3517872394 | 0.302396155 | 278 | 6 4 |
| ## 165 | 0.4 | 0.4359484250 | 0.6637608665 | 0.858806549 | 252 | 6 5 |
| ## 166 | 0.6 | 0.9272429442 | 2.1357689491 | 0.167585272 | 251 | 6 1 |
| ## 167 | 0.6 | 0.6898887212 | 1.4569178684 | 0.654897883 | 274 | 6 2 |
| ## 168 | 0.6 | 0.6130431054 | 1.0691134906 | 0.674831562 | 283 | 6 3 |
| ## 169 | 0.6 | 0.8605955987 | 1.4593481385 | 0.236393904 | 263 | 6 4 |
| ## 170 | 0.6 | 0.9091895602 | 1.6005360225 | 0.159862570 | 278 | 6 5 |
| ## 171 | 0.8 | 0.8277965846 | 2.1244902040 | 0.441949721 | 258 | 6 1 |
| ## 172 | 0.8 | 0.3409384235 | 0.7975674684 | 1.541762491 | 252 | 6 2 |
| ## 173 | 0.8 | 0.3559815008 | 0.7496828749 | 1.356277332 | 295 | 6 3 |
| ## 174 | 0.8 | 0.5948189622 | 1.0931094528 | 0.744608445 | 250 | 6 4 |
| ## 175 | 0.8 | 0.4712432342 | 0.9813492036 | 1.101119323 | 251 | 6 5 |
| ## 176 | 1.0 | 0.8243594883 | 2.6475797722 | 0.564101309 | 271 | 6 1 |
| ## 177 | 1.0 | 0.4473302092 | 1.2079186781 | 1.492365482 | 252 | 6 2 |
| ## 178 | 1.0 | 0.7675248691 | 1.9217614116 | 0.582081120 | 273 | 6 3 |
| ## 179 | 1.0 | 0.6573507703 | 1.5673426326 | 0.816989604 | 274 | 6 4 |
| ## 180 | 1.0 | 0.8902599369 | 1.8937439519 | 0.233436968 | 271 | 6 5 |
| ## 181 | 0.0 | -0.2288660716 | -0.2758317150 | 1.481041876 | 254 | 7 1 |
| ## 182 | 0.0 | 0.1294489317 | 0.1243046652 | 0.835955598 | 271 | 7 2 |
| ## 183 | 0.0 | -0.2881533637 | -0.2890038765 | 1.291955474 | 265 | 7 3 |
| ## 184 | 0.0 | -0.1964885089 | -0.1972415029 | 1.201073758 | 293 | 7 4 |
| ## 185 | 0.0 | -0.0211752434 | -0.0201280801 | 0.970675835 | 270 | 7 5 |
| ## 186 | 0.2 | 0.2762836823 | 0.4022458000 | 1.053670079 | 272 | 7 1 |
| ## 187 | 0.2 | 0.7179563237 | 1.0038269145 | 0.394345762 | 277 | 7 2 |
| ## 188 | 0.2 | 0.5890020249 | 0.7724086821 | 0.538976762 | 290 | 7 3 |
| ## 189 | 0.2 | 0.3745256947 | 0.4307083615 | 0.719301818 | 257 | 7 4 |
| ## 190 | 0.2 | 0.6325092480 | 0.8283655401 | 0.481284149 | 250 | 7 5 |

| | | | | | | |
|--------|-----|---------------|---------------|--------------|-----|-----|
| ## 191 | 0.4 | 0.6253864621 | 1.1706142710 | 0.701211139 | 274 | 7 1 |
| ## 192 | 0.4 | 0.5064280938 | 0.8543399045 | 0.832651625 | 253 | 7 2 |
| ## 193 | 0.4 | 0.1494665276 | 0.2208164985 | 1.256547712 | 278 | 7 3 |
| ## 194 | 0.4 | 0.4402156886 | 0.6140133446 | 0.780787796 | 290 | 7 4 |
| ## 195 | 0.4 | 0.3174582219 | 0.4423653630 | 0.951094729 | 267 | 7 5 |
| ## 196 | 0.6 | 0.6889828152 | 1.5887134989 | 0.717169121 | 253 | 7 1 |
| ## 197 | 0.6 | 0.5631873685 | 1.0211686386 | 0.792026571 | 263 | 7 2 |
| ## 198 | 0.6 | 0.5125771804 | 0.9219783763 | 0.876732943 | 264 | 7 3 |
| ## 199 | 0.6 | 0.8487151259 | 1.6967043416 | 0.302440354 | 292 | 7 4 |
| ## 200 | 0.6 | 0.2397198640 | 0.4014284123 | 1.273144589 | 259 | 7 5 |
| ## 201 | 0.8 | 0.8340038241 | 2.2343187575 | 0.444708236 | 275 | 7 1 |
| ## 202 | 0.8 | 0.6430571463 | 1.6311614806 | 0.905411653 | 282 | 7 2 |
| ## 203 | 0.8 | 0.3738760693 | 0.8591086501 | 1.438734728 | 271 | 7 3 |
| ## 204 | 0.8 | 0.6867431610 | 1.3036471614 | 0.594656652 | 276 | 7 4 |
| ## 205 | 0.8 | 0.9570357215 | 1.8239778213 | 0.081883977 | 266 | 7 5 |
| ## 206 | 1.0 | 0.8586795157 | 2.7195484282 | 0.447580143 | 255 | 7 1 |
| ## 207 | 1.0 | 0.7029628985 | 1.9439333487 | 0.821409392 | 268 | 7 2 |
| ## 208 | 1.0 | 0.9486566171 | 2.4853345852 | 0.134511775 | 297 | 7 3 |
| ## 209 | 1.0 | 0.6619679551 | 1.4349226330 | 0.732739143 | 262 | 7 4 |
| ## 210 | 1.0 | 0.6745729218 | 1.4644556484 | 0.706481845 | 294 | 7 5 |
| ## 211 | 0.0 | 0.1560318009 | 0.1709454677 | 0.924635476 | 253 | 8 1 |
| ## 212 | 0.0 | -0.3266905401 | -0.3808144367 | 1.546487727 | 278 | 8 2 |
| ## 213 | 0.0 | -0.0569844588 | -0.0645141001 | 1.196649096 | 250 | 8 3 |
| ## 214 | 0.0 | 0.0002867729 | 0.0002873988 | 1.001895003 | 279 | 8 4 |
| ## 215 | 0.0 | 0.4268467721 | 0.4906121797 | 0.658774935 | 287 | 8 5 |
| ## 216 | 0.2 | 0.6385877470 | 0.9079408070 | 0.513854101 | 268 | 8 1 |
| ## 217 | 0.2 | 0.1672227112 | 0.2348964745 | 1.169795944 | 287 | 8 2 |
| ## 218 | 0.2 | 0.4817447130 | 0.6891232950 | 0.741350722 | 291 | 8 3 |
| ## 219 | 0.2 | 0.4433265966 | 0.5679470169 | 0.713155947 | 282 | 8 4 |
| ## 220 | 0.2 | 0.1612125969 | 0.1880606813 | 0.978477697 | 260 | 8 5 |
| ## 221 | 0.4 | 0.6654843470 | 1.3706813610 | 0.688993472 | 284 | 8 1 |
| ## 222 | 0.4 | 0.3942968243 | 0.6141165033 | 0.943381466 | 295 | 8 2 |
| ## 223 | 0.4 | 0.6252673400 | 0.9620978525 | 0.576600542 | 265 | 8 3 |
| ## 224 | 0.4 | 0.1765122914 | 0.2425749513 | 1.131691676 | 266 | 8 4 |
| ## 225 | 0.4 | 0.4671678731 | 0.6159743108 | 0.702554523 | 263 | 8 5 |
| ## 226 | 0.6 | 0.6512791903 | 1.6147157983 | 0.864583129 | 275 | 8 1 |
| ## 227 | 0.6 | 0.7689248821 | 1.2651032304 | 0.380185224 | 263 | 8 2 |
| ## 228 | 0.6 | 0.5778969971 | 1.0143218215 | 0.740873008 | 273 | 8 3 |
| ## 229 | 0.6 | 0.5527498387 | 1.0473542038 | 0.847452688 | 271 | 8 4 |
| ## 230 | 0.6 | 0.7804620207 | 1.3138471163 | 0.369575115 | 250 | 8 5 |
| ## 231 | 0.8 | 1.1925815936 | 3.3830803094 | -0.546309788 | 253 | 8 1 |
| ## 232 | 0.8 | 0.7127888505 | 1.7602706858 | 0.709283495 | 250 | 8 2 |
| ## 233 | 0.8 | 0.6633365007 | 1.3817331106 | 0.701271683 | 268 | 8 3 |
| ## 234 | 0.8 | 0.6559711539 | 1.2553821380 | 0.658394299 | 257 | 8 4 |
| ## 235 | 0.8 | 0.6409341235 | 1.2674630558 | 0.710061637 | 264 | 8 5 |
| ## 236 | 1.0 | 0.9183734446 | 2.9732088338 | 0.264263734 | 277 | 8 1 |
| ## 237 | 1.0 | 0.7794028566 | 2.1821765888 | 0.617629148 | 283 | 8 2 |
| ## 238 | 1.0 | 0.6386618392 | 1.5874624257 | 0.898144711 | 283 | 8 3 |
| ## 239 | 1.0 | 1.1676197170 | 3.0503393868 | -0.437896875 | 290 | 8 4 |
| ## 240 | 1.0 | 0.6947946321 | 1.5087951295 | 0.662774799 | 285 | 8 5 |
| ## 241 | 0.0 | 0.0036049646 | 0.0036199878 | 1.000547395 | 260 | 9 1 |
| ## 242 | 0.0 | -0.0384777716 | -0.0411065548 | 1.109426082 | 295 | 9 2 |
| ## 243 | 0.0 | -0.1351311655 | -0.1061068046 | 0.891320224 | 276 | 9 3 |
| ## 244 | 0.0 | 0.1057942473 | 0.1122173112 | 0.948495479 | 268 | 9 4 |

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|--------|-----|---------------|---------------|--------------|-----|------|
| ## 245 | 0.0 | 0.3090185954 | 0.2820658101 | 0.630713597 | 256 | 9 5 |
| ## 246 | 0.2 | 0.5742379435 | 0.8039328721 | 0.596066695 | 270 | 9 1 |
| ## 247 | 0.2 | 0.1277171331 | 0.1740504911 | 1.188730578 | 258 | 9 2 |
| ## 248 | 0.2 | 0.0057643359 | 0.0077259108 | 1.332569125 | 275 | 9 3 |
| ## 249 | 0.2 | 0.7592474001 | 1.0288056735 | 0.326227842 | 258 | 9 4 |
| ## 250 | 0.2 | 0.0098387595 | 0.0117289894 | 1.180391764 | 297 | 9 5 |
| ## 251 | 0.4 | 0.5602054475 | 1.0209389146 | 0.801497692 | 274 | 9 1 |
| ## 252 | 0.4 | 0.3024747319 | 0.4766713237 | 1.099233284 | 269 | 9 2 |
| ## 253 | 0.4 | 0.2073927134 | 0.3599644187 | 1.375701280 | 294 | 9 3 |
| ## 254 | 0.4 | 0.3155140338 | 0.4537951392 | 0.984477300 | 266 | 9 4 |
| ## 255 | 0.4 | 0.1367604161 | 0.2168569663 | 1.368813598 | 250 | 9 5 |
| ## 256 | 0.6 | 0.8484740694 | 1.7428984890 | 0.311257969 | 271 | 9 1 |
| ## 257 | 0.6 | 0.5401618033 | 1.0327742704 | 0.879197780 | 285 | 9 2 |
| ## 258 | 0.6 | 0.8415011897 | 1.6313519798 | 0.307269141 | 258 | 9 3 |
| ## 259 | 0.6 | 0.9351155671 | 1.8312540059 | 0.127064378 | 280 | 9 4 |
| ## 260 | 0.6 | 0.4705362911 | 0.6959846649 | 0.783146016 | 300 | 9 5 |
| ## 261 | 0.8 | 0.7135701560 | 1.8606182866 | 0.746859438 | 252 | 9 1 |
| ## 262 | 0.8 | 0.5056152489 | 1.2165775025 | 1.189555432 | 283 | 9 2 |
| ## 263 | 0.8 | 0.7727815664 | 1.6089786928 | 0.473082737 | 293 | 9 3 |
| ## 264 | 0.8 | 0.6916634729 | 1.3164828049 | 0.586874617 | 268 | 9 4 |
| ## 265 | 0.8 | 0.8901289736 | 1.6137447814 | 0.199188882 | 294 | 9 5 |
| ## 266 | 1.0 | 1.2078187229 | 3.9505645666 | -0.679738828 | 258 | 9 1 |
| ## 267 | 1.0 | 0.2133181047 | 0.5743956254 | 2.118276083 | 283 | 9 2 |
| ## 268 | 1.0 | 0.8782228111 | 2.2229155267 | 0.308236589 | 286 | 9 3 |
| ## 269 | 1.0 | 0.7896478648 | 1.9139403573 | 0.509849337 | 289 | 9 4 |
| ## 270 | 1.0 | 0.7554485213 | 1.7833215693 | 0.577291390 | 267 | 9 5 |
| ## 271 | 0.0 | 0.1483188153 | 0.1505623736 | 0.864564219 | 260 | 10 1 |
| ## 272 | 0.0 | -0.1275764568 | -0.1219929533 | 1.078227014 | 254 | 10 2 |
| ## 273 | 0.0 | 0.3141081818 | 0.2956540073 | 0.645594978 | 275 | 10 3 |
| ## 274 | 0.0 | -0.1716387102 | -0.1756421598 | 1.198967024 | 254 | 10 4 |
| ## 275 | 0.0 | 0.1690683798 | 0.1648160383 | 0.810032354 | 294 | 10 5 |
| ## 276 | 0.2 | 0.4724348276 | 0.6175564751 | 0.689621656 | 283 | 10 1 |
| ## 277 | 0.2 | 0.7047857584 | 1.0658573831 | 0.446456636 | 274 | 10 2 |
| ## 278 | 0.2 | 0.3939294869 | 0.5156140343 | 0.793285277 | 294 | 10 3 |
| ## 279 | 0.2 | 0.4301433241 | 0.5222907761 | 0.691934220 | 280 | 10 4 |
| ## 280 | 0.2 | 0.2187777581 | 0.2364073429 | 0.844174819 | 294 | 10 5 |
| ## 281 | 0.4 | 0.7483725683 | 1.2742283280 | 0.428437406 | 262 | 10 1 |
| ## 282 | 0.4 | 0.4354409559 | 0.6915872358 | 0.896658487 | 253 | 10 2 |
| ## 283 | 0.4 | 0.7042874596 | 1.0870379418 | 0.456419814 | 263 | 10 3 |
| ## 284 | 0.4 | 0.3645179727 | 0.5353358617 | 0.933277216 | 256 | 10 4 |
| ## 285 | 0.4 | 0.2007815464 | 0.2767832937 | 1.101746251 | 303 | 10 5 |
| ## 286 | 0.6 | 0.6233047335 | 1.4907021394 | 0.900908351 | 278 | 10 1 |
| ## 287 | 0.6 | 0.3268610927 | 0.6274583226 | 1.292189921 | 295 | 10 2 |
| ## 288 | 0.6 | 0.6141556694 | 1.2059902062 | 0.757665372 | 279 | 10 3 |
| ## 289 | 0.6 | 1.1349621415 | 2.1382395970 | -0.254265217 | 281 | 10 4 |
| ## 290 | 0.6 | 0.7256837428 | 1.1660609088 | 0.440783561 | 251 | 10 5 |
| ## 291 | 0.8 | 1.1894674503 | 3.4748049949 | -0.553493450 | 257 | 10 1 |
| ## 292 | 0.8 | 1.0009445778 | 2.3225491181 | -0.002191758 | 267 | 10 2 |
| ## 293 | 0.8 | 0.7676007222 | 1.5735216970 | 0.476400419 | 276 | 10 3 |
| ## 294 | 0.8 | 0.3518007150 | 0.7466786873 | 1.375769209 | 297 | 10 4 |
| ## 295 | 0.8 | 0.9571193467 | 1.8976595385 | 0.085018531 | 291 | 10 5 |
| ## 296 | 1.0 | 1.4492732493 | 5.0640798924 | -1.569859672 | 275 | 10 1 |
| ## 297 | 1.0 | 0.9484435075 | 2.5772470176 | 0.140096712 | 294 | 10 2 |
| ## 298 | 1.0 | 0.9143375876 | 2.2960928245 | 0.215116225 | 262 | 10 3 |

```

## 299      1.0  0.7967399852  1.7233955818  0.439663401  286  10  4
## 300      1.0  0.9120525178  2.1260184411  0.205007897  252  10  5
##          c
## 1      6.000000e-01
## 2     -1.000000e-01
## 3     -4.000000e-01
## 4     -6.000000e-01
## 5     -7.000000e-01
## 6      6.000000e-01
## 7      1.387779e-16
## 8     -4.000000e-01
## 9     -6.000000e-01
## 10    -7.000000e-01
## 11     6.000000e-01
## 12     1.387779e-16
## 13    -4.000000e-01
## 14    -6.000000e-01
## 15    -8.000000e-01
## 16     6.000000e-01
## 17    -1.000000e-01
## 18    -4.000000e-01
## 19    -6.000000e-01
## 20    -8.000000e-01
## 21     6.000000e-01
## 22     1.387779e-16
## 23    -4.000000e-01
## 24    -6.000000e-01
## 25    -7.000000e-01
## 26     7.000000e-01
## 27     1.387779e-16
## 28    -4.000000e-01
## 29    -6.000000e-01
## 30    -8.000000e-01
## 31     7.000000e-01
## 32     1.387779e-16
## 33    -3.000000e-01
## 34    -6.000000e-01
## 35    -8.000000e-01
## 36     6.000000e-01
## 37     1.387779e-16
## 38    -4.000000e-01
## 39    -6.000000e-01
## 40    -8.000000e-01
## 41     6.000000e-01
## 42    -1.000000e-01
## 43    -4.000000e-01
## 44    -6.000000e-01
## 45    -7.000000e-01
## 46     6.000000e-01
## 47    -1.000000e-01
## 48    -3.000000e-01
## 49    -6.000000e-01
## 50    -7.000000e-01
## 51     6.000000e-01

```

```
## 52  1.387779e-16
## 53 -4.000000e-01
## 54 -6.000000e-01
## 55 -7.000000e-01
## 56  5.000000e-01
## 57  1.387779e-16
## 58 -3.000000e-01
## 59 -6.000000e-01
## 60 -7.000000e-01
## 61  6.000000e-01
## 62  1.387779e-16
## 63 -4.000000e-01
## 64 -6.000000e-01
## 65 -8.000000e-01
## 66  7.000000e-01
## 67  1.387779e-16
## 68 -4.000000e-01
## 69 -6.000000e-01
## 70 -8.000000e-01
## 71  6.000000e-01
## 72  1.387779e-16
## 73 -4.000000e-01
## 74 -6.000000e-01
## 75 -7.000000e-01
## 76  6.000000e-01
## 77  1.387779e-16
## 78 -4.000000e-01
## 79 -6.000000e-01
## 80 -7.000000e-01
## 81  6.000000e-01
## 82 -1.000000e-01
## 83 -4.000000e-01
## 84 -6.000000e-01
## 85 -8.000000e-01
## 86  7.000000e-01
## 87  1.387779e-16
## 88 -4.000000e-01
## 89 -6.000000e-01
## 90 -7.000000e-01
## 91  7.000000e-01
## 92  1.387779e-16
## 93 -4.000000e-01
## 94 -6.000000e-01
## 95 -7.000000e-01
## 96  6.000000e-01
## 97  1.387779e-16
## 98 -4.000000e-01
## 99 -5.000000e-01
## 100 -7.000000e-01
## 101  6.000000e-01
## 102 -1.000000e-01
## 103 -4.000000e-01
## 104 -5.000000e-01
## 105 -7.000000e-01
```

```
## 106 6.000000e-01
## 107 -1.000000e-01
## 108 -4.000000e-01
## 109 -6.000000e-01
## 110 -8.000000e-01
## 111 7.000000e-01
## 112 1.387779e-16
## 113 -3.000000e-01
## 114 -6.000000e-01
## 115 -8.000000e-01
## 116 6.000000e-01
## 117 1.387779e-16
## 118 -3.000000e-01
## 119 -6.000000e-01
## 120 -7.000000e-01
## 121 7.000000e-01
## 122 1.387779e-16
## 123 -4.000000e-01
## 124 -6.000000e-01
## 125 -8.000000e-01
## 126 6.000000e-01
## 127 1.387779e-16
## 128 -4.000000e-01
## 129 -5.000000e-01
## 130 -7.000000e-01
## 131 6.000000e-01
## 132 -1.000000e-01
## 133 -3.000000e-01
## 134 -6.000000e-01
## 135 -8.000000e-01
## 136 7.000000e-01
## 137 1.387779e-16
## 138 -3.000000e-01
## 139 -6.000000e-01
## 140 -7.000000e-01
## 141 6.000000e-01
## 142 -1.000000e-01
## 143 -4.000000e-01
## 144 -6.000000e-01
## 145 -8.000000e-01
## 146 7.000000e-01
## 147 1.387779e-16
## 148 -4.000000e-01
## 149 -6.000000e-01
## 150 -8.000000e-01
## 151 7.000000e-01
## 152 -1.000000e-01
## 153 -4.000000e-01
## 154 -6.000000e-01
## 155 -7.000000e-01
## 156 6.000000e-01
## 157 1.387779e-16
## 158 -4.000000e-01
## 159 -6.000000e-01
```

```
## 160 -8.000000e-01
## 161  6.000000e-01
## 162 -1.000000e-01
## 163 -4.000000e-01
## 164 -6.000000e-01
## 165 -7.000000e-01
## 166  8.000000e-01
## 167 -1.000000e-01
## 168 -4.000000e-01
## 169 -6.000000e-01
## 170 -8.000000e-01
## 171  6.000000e-01
## 172  1.387779e-16
## 173 -4.000000e-01
## 174 -6.000000e-01
## 175 -7.000000e-01
## 176  6.000000e-01
## 177  1.387779e-16
## 178 -3.000000e-01
## 179 -6.000000e-01
## 180 -7.000000e-01
## 181  7.000000e-01
## 182 -1.000000e-01
## 183 -4.000000e-01
## 184 -6.000000e-01
## 185 -7.000000e-01
## 186  6.000000e-01
## 187 -1.000000e-01
## 188 -4.000000e-01
## 189 -5.000000e-01
## 190 -7.000000e-01
## 191  6.000000e-01
## 192  1.387779e-16
## 193 -4.000000e-01
## 194 -6.000000e-01
## 195 -7.000000e-01
## 196  7.000000e-01
## 197 -1.000000e-01
## 198 -4.000000e-01
## 199 -6.000000e-01
## 200 -7.000000e-01
## 201  6.000000e-01
## 202 -1.000000e-01
## 203 -3.000000e-01
## 204 -6.000000e-01
## 205 -7.000000e-01
## 206  7.000000e-01
## 207  1.387779e-16
## 208 -4.000000e-01
## 209 -6.000000e-01
## 210 -8.000000e-01
## 211  7.000000e-01
## 212 -1.000000e-01
## 213 -3.000000e-01
```

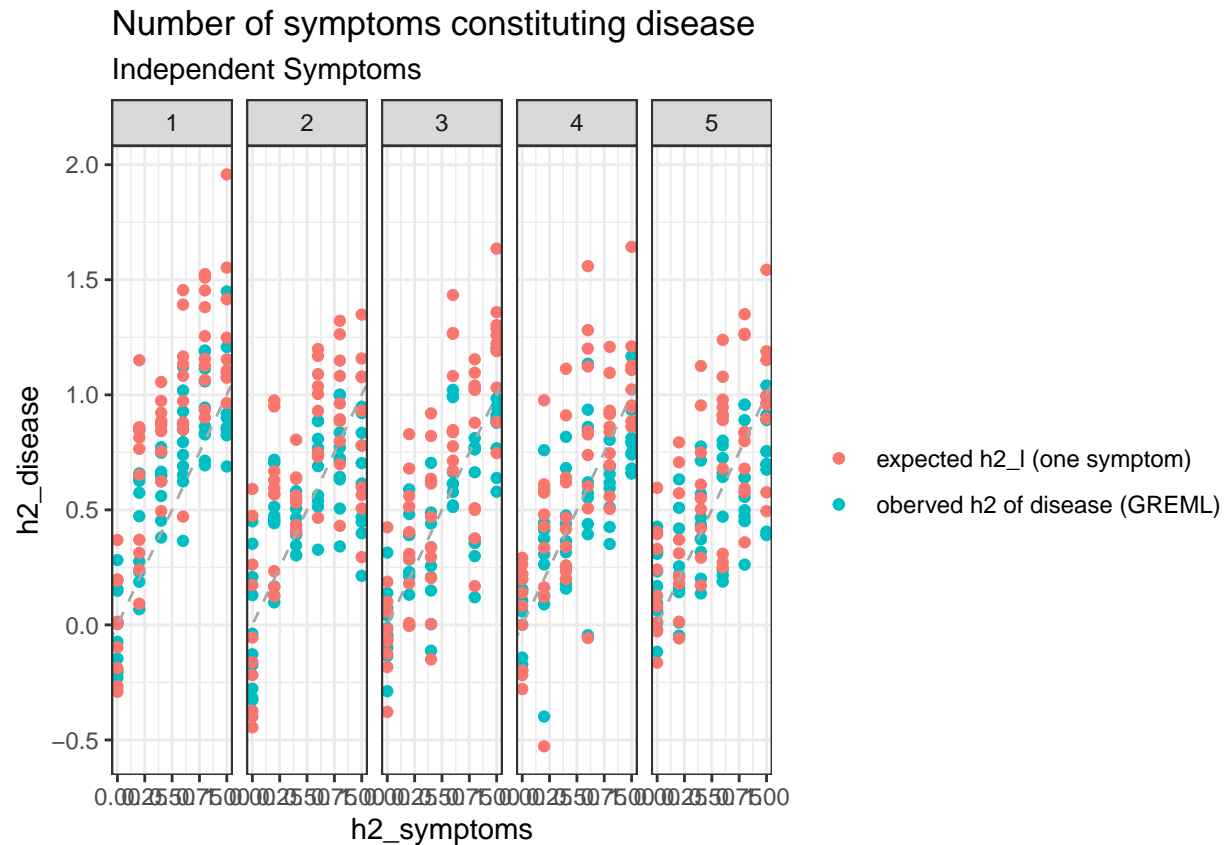
214 -6.000000e-01
215 -8.000000e-01
216 6.000000e-01
217 -1.000000e-01
218 -4.000000e-01
219 -6.000000e-01
220 -7.000000e-01
221 6.000000e-01
222 -1.000000e-01
223 -4.000000e-01
224 -6.000000e-01
225 -7.000000e-01
226 6.000000e-01
227 1.387779e-16
228 -4.000000e-01
229 -6.000000e-01
230 -7.000000e-01
231 7.000000e-01
232 1.387779e-16
233 -4.000000e-01
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236 6.000000e-01
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241 6.000000e-01
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245 -7.000000e-01
246 7.000000e-01
247 1.387779e-16
248 -4.000000e-01
249 -5.000000e-01
250 -8.000000e-01
251 6.000000e-01
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256 6.000000e-01
257 -1.000000e-01
258 -4.000000e-01
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261 6.000000e-01
262 -1.000000e-01
263 -4.000000e-01
264 -6.000000e-01
265 -8.000000e-01
266 7.000000e-01
267 -1.000000e-01

```
## 268 -4.000000e-01
## 269 -6.000000e-01
## 270 -7.000000e-01
## 271  6.000000e-01
## 272  1.387779e-16
## 273 -4.000000e-01
## 274 -6.000000e-01
## 275 -8.000000e-01
## 276  5.000000e-01
## 277  1.387779e-16
## 278 -4.000000e-01
## 279 -6.000000e-01
## 280 -8.000000e-01
## 281  6.000000e-01
## 282  1.387779e-16
## 283 -4.000000e-01
## 284 -6.000000e-01
## 285 -8.000000e-01
## 286  5.000000e-01
## 287 -1.000000e-01
## 288 -4.000000e-01
## 289 -6.000000e-01
## 290 -7.000000e-01
## 291  7.000000e-01
## 292  1.387779e-16
## 293 -4.000000e-01
## 294 -6.000000e-01
## 295 -8.000000e-01
## 296  6.000000e-01
## 297 -1.000000e-01
## 298 -4.000000e-01
## 299 -6.000000e-01
## 300 -7.000000e-01
```

```
rows <- rows %>% mutate(h2_l = h2_disease * (prev/N) * (1-prev/N) / dnorm(prev/N)^2)
```

How is disease heritability affected by the number of symptoms constituting the disease?

```
ggplot(rows, aes(x=h2_symptoms, y=h2_disease)) +
  geom_point(aes(col="observed h2 of disease (GREML)")) +
  geom_point(aes(y=h2_l, col="expected h2_l (one symptom)")) +
  geom_abline(slope=1, intercept=0, lty=2, col="darkgrey") +
  facet_wrap(~P, nrow=1) +
  labs(title = "Number of symptoms constituting disease",
       col="",
       subtitle = "Independent Symptoms")
```



```
rows_n <- data.frame()
reps <- 10
p <- 5

for (r in c(1:reps)){
  print(r)
  for (her in heritabilities){
    for (n in c(0:(p-1))){
      G <- simulate_genotypes(N = N, L = 1)
      G <- scale(G)
      beta <- matrix(rnorm(p * 1), nrow=1) %%% diag(1, p, p) * sqrt(her / 1)
      e <- matrix(rnorm(p * N), nrow=N) * sqrt(1-her)

      X <- G %%% beta + e

      c <- 1
      Y <- apply(X, 1, mdd_risk, threshold=c, n=n)
      prev <- sum(Y)/N

      while (prev<0.25){
        c <- c - 0.1
        Y <- apply(X, 1, mdd_risk, threshold=c, n=n)
        prev <- sum(Y)/N
      }

      res <- greml(Y, G)
    }
  }
}
```



```

h2 <- res$h2

rows_n <- rbind(rows_n, data.frame("h2_symptoms"=her,
                                   "h2_disease"=h2,
                                   "sig2g"=res$sig2g,
                                   "sig2e"=res$sig2e,
                                   "prev"=sum(Y),
                                   "rep"=r,
                                   "P"=p,
                                   "c"=c,
                                   "n"=n))
}
}
}

```

```

## [1] 1
## [1] 2
## [1] 3
## [1] 4
## [1] 5
## [1] 6
## [1] 7
## [1] 8
## [1] 9
## [1] 10

```

```
rows_n
```

| ## | h2_symptoms | h2_disease | sig2g | sig2e | prev | rep | P | c | n |
|-------|-------------|---------------|---------------|------------|------|-----|---|------|---|
| ## 1 | 0.0 | -0.3296734669 | -0.3075083778 | 1.24027491 | 583 | 1 | 5 | 1.0 | 0 |
| ## 2 | 0.0 | -0.1210165550 | -0.1136669716 | 1.05293492 | 265 | 1 | 5 | 0.8 | 1 |
| ## 3 | 0.0 | -0.5726993924 | -0.5669322829 | 1.55686224 | 287 | 1 | 5 | 0.3 | 2 |
| ## 4 | 0.0 | 0.5194254577 | 0.6295999385 | 0.58250842 | 320 | 1 | 5 | -0.2 | 3 |
| ## 5 | 0.0 | 0.2699823387 | 0.3173009403 | 0.85796460 | 304 | 1 | 5 | -0.8 | 4 |
| ## 6 | 0.2 | 0.0783092179 | 0.0930909941 | 1.09567064 | 586 | 1 | 5 | 1.0 | 0 |
| ## 7 | 0.2 | 0.4454522185 | 0.5776397838 | 0.71910936 | 288 | 1 | 5 | 0.8 | 1 |
| ## 8 | 0.2 | 0.5352282073 | 0.6894371226 | 0.59868094 | 292 | 1 | 5 | 0.3 | 2 |
| ## 9 | 0.2 | 0.1550576185 | 0.1861124231 | 1.01416670 | 296 | 1 | 5 | -0.2 | 3 |
| ## 10 | 0.2 | 0.3983941187 | 0.5026451319 | 0.75903296 | 299 | 1 | 5 | -0.8 | 4 |
| ## 11 | 0.4 | 0.1752188453 | 0.2495713260 | 1.17476934 | 579 | 1 | 5 | 1.0 | 0 |
| ## 12 | 0.4 | 0.5557638013 | 0.8109194029 | 0.64818859 | 292 | 1 | 5 | 0.8 | 1 |
| ## 13 | 0.4 | 0.1356750885 | 0.1966118119 | 1.25252534 | 277 | 1 | 5 | 0.3 | 2 |
| ## 14 | 0.4 | 0.7041980935 | 1.0289861294 | 0.43223073 | 294 | 1 | 5 | -0.2 | 3 |
| ## 15 | 0.4 | 0.4992399428 | 0.7702930209 | 0.77263845 | 269 | 1 | 5 | -0.7 | 4 |
| ## 16 | 0.6 | 0.4802234855 | 0.8444458646 | 0.91399763 | 577 | 1 | 5 | 1.0 | 0 |
| ## 17 | 0.6 | 0.1526169089 | 0.2881037624 | 1.59965405 | 264 | 1 | 5 | 0.8 | 1 |
| ## 18 | 0.6 | 0.2129267044 | 0.4314151547 | 1.59470532 | 289 | 1 | 5 | 0.3 | 2 |
| ## 19 | 0.6 | 0.7493254777 | 1.2104706898 | 0.40494307 | 313 | 1 | 5 | -0.2 | 3 |
| ## 20 | 0.6 | 0.2736949626 | 0.4635470066 | 1.23011590 | 281 | 1 | 5 | -0.8 | 4 |
| ## 21 | 0.8 | 0.9350026675 | 1.8715922798 | 0.13010498 | 557 | 1 | 5 | 1.0 | 0 |
| ## 22 | 0.8 | 0.3548556372 | 0.7895489758 | 1.43543745 | 294 | 1 | 5 | 0.8 | 1 |
| ## 23 | 0.8 | 0.4877778034 | 0.9698791145 | 1.01848343 | 280 | 1 | 5 | 0.3 | 2 |
| ## 24 | 0.8 | 0.2947084667 | 0.6625209513 | 1.58553442 | 294 | 1 | 5 | -0.2 | 3 |

| | | | | | | | | | |
|-------|-----|---------------|---------------|------------|-----|---|---|------|---|
| ## 25 | 0.8 | 0.6395979470 | 1.2536278914 | 0.70639699 | 292 | 1 | 5 | -0.8 | 4 |
| ## 26 | 1.0 | 0.6360429823 | 1.4545999386 | 0.83235233 | 567 | 1 | 5 | 1.0 | 0 |
| ## 27 | 1.0 | 0.6995932846 | 1.5804986852 | 0.67866921 | 276 | 1 | 5 | 0.8 | 1 |
| ## 28 | 1.0 | 0.9948781882 | 2.4554630308 | 0.01264117 | 295 | 1 | 5 | 0.3 | 2 |
| ## 29 | 1.0 | 0.4461912620 | 1.0799173488 | 1.34038408 | 308 | 1 | 5 | -0.2 | 3 |
| ## 30 | 1.0 | 0.6540011573 | 1.4224054089 | 0.75252256 | 287 | 1 | 5 | -0.8 | 4 |
| ## 31 | 0.0 | -0.2345605329 | -0.2355076055 | 1.23954525 | 596 | 2 | 5 | 1.0 | 0 |
| ## 32 | 0.0 | -0.0229748419 | -0.0233208740 | 1.03838222 | 294 | 2 | 5 | 0.8 | 1 |
| ## 33 | 0.0 | -0.2684127877 | -0.2673867821 | 1.26356429 | 298 | 2 | 5 | 0.3 | 2 |
| ## 34 | 0.0 | -0.2372702108 | -0.2492623013 | 1.29980421 | 295 | 2 | 5 | -0.2 | 3 |
| ## 35 | 0.0 | -0.1759409623 | -0.1577909891 | 1.05463154 | 259 | 2 | 5 | -0.7 | 4 |
| ## 36 | 0.2 | -0.0483801278 | -0.0610598819 | 1.32314588 | 590 | 2 | 5 | 1.0 | 0 |
| ## 37 | 0.2 | -0.1966953888 | -0.2454521555 | 1.49333172 | 276 | 2 | 5 | 0.8 | 1 |
| ## 38 | 0.2 | 0.4275655084 | 0.6004210051 | 0.80385739 | 305 | 2 | 5 | 0.3 | 2 |
| ## 39 | 0.2 | 0.1090265185 | 0.1468667677 | 1.20020704 | 293 | 2 | 5 | -0.2 | 3 |
| ## 40 | 0.2 | 0.2728939970 | 0.3489105475 | 0.92964652 | 299 | 2 | 5 | -0.8 | 4 |
| ## 41 | 0.4 | 0.4211275254 | 0.6129649129 | 0.84256786 | 573 | 2 | 5 | 1.0 | 0 |
| ## 42 | 0.4 | 0.4883318426 | 0.7153377831 | 0.74952222 | 251 | 2 | 5 | 0.9 | 1 |
| ## 43 | 0.4 | 0.5164815093 | 0.7995001962 | 0.74847428 | 288 | 2 | 5 | 0.3 | 2 |
| ## 44 | 0.4 | 0.7072629797 | 1.1131812449 | 0.46074709 | 269 | 2 | 5 | -0.1 | 3 |
| ## 45 | 0.4 | 0.1260051223 | 0.1955234791 | 1.35618708 | 265 | 2 | 5 | -0.7 | 4 |
| ## 46 | 0.6 | 0.8038057676 | 1.4338451145 | 0.34997527 | 571 | 2 | 5 | 1.0 | 0 |
| ## 47 | 0.6 | 0.3549437891 | 0.7523485221 | 1.36727871 | 268 | 2 | 5 | 0.9 | 1 |
| ## 48 | 0.6 | 0.8131422323 | 1.6191864115 | 0.37208442 | 283 | 2 | 5 | 0.3 | 2 |
| ## 49 | 0.6 | 0.3094882431 | 0.6030014135 | 1.34538088 | 303 | 2 | 5 | -0.2 | 3 |
| ## 50 | 0.6 | 0.6627948521 | 1.2395596697 | 0.63064144 | 294 | 2 | 5 | -0.8 | 4 |
| ## 51 | 0.8 | 0.6588494561 | 1.2485296368 | 0.64648542 | 600 | 2 | 5 | 1.0 | 0 |
| ## 52 | 0.8 | 0.2652475912 | 0.5062666440 | 1.40239025 | 287 | 2 | 5 | 0.8 | 1 |
| ## 53 | 0.8 | 0.7676750215 | 1.6865317525 | 0.51040276 | 290 | 2 | 5 | 0.3 | 2 |
| ## 54 | 0.8 | 0.5213027412 | 1.0568211490 | 0.97044835 | 300 | 2 | 5 | -0.2 | 3 |
| ## 55 | 0.8 | 0.5603474990 | 1.0192800101 | 0.79973411 | 264 | 2 | 5 | -0.7 | 4 |
| ## 56 | 1.0 | 0.5640932748 | 1.2547929815 | 0.96964939 | 570 | 2 | 5 | 1.0 | 0 |
| ## 57 | 1.0 | 0.9630493414 | 2.4240647740 | 0.09300748 | 304 | 2 | 5 | 0.8 | 1 |
| ## 58 | 1.0 | 0.6897940601 | 1.8578883378 | 0.83550734 | 300 | 2 | 5 | 0.3 | 2 |
| ## 59 | 1.0 | 0.6602598860 | 1.7798112125 | 0.91581100 | 256 | 2 | 5 | -0.1 | 3 |
| ## 60 | 1.0 | 0.8414747316 | 1.5413329404 | 0.29037143 | 290 | 2 | 5 | -0.8 | 4 |
| ## 61 | 0.0 | -0.3813371648 | -0.3531773891 | 1.27933257 | 582 | 3 | 5 | 1.0 | 0 |
| ## 62 | 0.0 | 0.5042918492 | 0.5052829683 | 0.49668240 | 295 | 3 | 5 | 0.8 | 1 |
| ## 63 | 0.0 | 0.1442629892 | 0.1645591032 | 0.97612919 | 306 | 3 | 5 | 0.3 | 2 |
| ## 64 | 0.0 | 0.2320950000 | 0.2336420943 | 0.77302369 | 315 | 3 | 5 | -0.2 | 3 |
| ## 65 | 0.0 | 0.3067583863 | 0.3553224945 | 0.80299138 | 291 | 3 | 5 | -0.8 | 4 |
| ## 66 | 0.2 | 0.3653705835 | 0.4739940547 | 0.82330265 | 566 | 3 | 5 | 1.0 | 0 |
| ## 67 | 0.2 | 0.3257710819 | 0.3708257236 | 0.76747581 | 267 | 3 | 5 | 0.8 | 1 |
| ## 68 | 0.2 | 0.5398720040 | 0.6759986789 | 0.57614752 | 250 | 3 | 5 | 0.4 | 2 |
| ## 69 | 0.2 | 0.2218002337 | 0.2847970371 | 0.99922793 | 312 | 3 | 5 | -0.2 | 3 |
| ## 70 | 0.2 | 0.1286817142 | 0.1642952061 | 1.11246122 | 257 | 3 | 5 | -0.7 | 4 |
| ## 71 | 0.4 | 0.6680300303 | 1.0335385620 | 0.51360530 | 573 | 3 | 5 | 1.0 | 0 |
| ## 72 | 0.4 | 0.3597764631 | 0.5795486583 | 1.03130897 | 293 | 3 | 5 | 0.8 | 1 |
| ## 73 | 0.4 | 0.4005400783 | 0.6553964310 | 0.98088535 | 266 | 3 | 5 | 0.3 | 2 |
| ## 74 | 0.4 | 0.4372709621 | 0.7897886710 | 1.01638814 | 286 | 3 | 5 | -0.2 | 3 |
| ## 75 | 0.4 | 0.6697663418 | 0.9865486523 | 0.48642571 | 264 | 3 | 5 | -0.7 | 4 |
| ## 76 | 0.6 | 0.6413453874 | 1.0760959908 | 0.60177682 | 568 | 3 | 5 | 1.0 | 0 |
| ## 77 | 0.6 | 0.5027009527 | 0.8967901755 | 0.88715348 | 291 | 3 | 5 | 0.8 | 1 |
| ## 78 | 0.6 | 0.5675612174 | 1.1642759903 | 0.88709037 | 280 | 3 | 5 | 0.3 | 2 |

| | | | | | | | |
|--------|-----|---------------|---------------|------------|-----|-----|--------|
| ## 79 | 0.6 | 0.5545560634 | 1.0059412397 | 0.80801646 | 299 | 3 5 | -0.2 3 |
| ## 80 | 0.6 | 0.3786132686 | 0.5818226406 | 0.95489751 | 273 | 3 5 | -0.7 4 |
| ## 81 | 0.8 | 0.3033860789 | 0.5905633948 | 1.35601041 | 592 | 3 5 | 1.0 0 |
| ## 82 | 0.8 | 0.6956461735 | 1.5665808942 | 0.68539857 | 296 | 3 5 | 0.8 1 |
| ## 83 | 0.8 | 0.8272076815 | 1.8590249847 | 0.38832478 | 278 | 3 5 | 0.3 2 |
| ## 84 | 0.8 | 0.6826790752 | 1.5031806431 | 0.69870410 | 279 | 3 5 | -0.2 3 |
| ## 85 | 0.8 | 0.7800500997 | 1.4539752879 | 0.40997587 | 258 | 3 5 | -0.7 4 |
| ## 86 | 1.0 | 0.5330373681 | 1.2051948451 | 1.05580019 | 598 | 3 5 | 1.0 0 |
| ## 87 | 1.0 | 0.7332008706 | 1.5379358658 | 0.55962829 | 261 | 3 5 | 0.8 1 |
| ## 88 | 1.0 | 0.4196418346 | 1.0227668882 | 1.41447078 | 277 | 3 5 | 0.3 2 |
| ## 89 | 1.0 | 0.9720501363 | 2.4628467282 | 0.07081551 | 315 | 3 5 | -0.2 3 |
| ## 90 | 1.0 | 0.7256043944 | 1.4723816527 | 0.55679797 | 308 | 3 5 | -0.8 4 |
| ## 91 | 0.0 | -0.0944586923 | -0.0752393870 | 0.87177156 | 581 | 4 5 | 1.0 0 |
| ## 92 | 0.0 | 0.0378505396 | 0.0398572574 | 1.01315963 | 291 | 4 5 | 0.8 1 |
| ## 93 | 0.0 | 0.1909463775 | 0.2233868909 | 0.94650643 | 279 | 4 5 | 0.3 2 |
| ## 94 | 0.0 | 0.2200735280 | 0.2144627121 | 0.76004210 | 293 | 4 5 | -0.2 3 |
| ## 95 | 0.0 | 0.2936801330 | 0.3390621471 | 0.81546657 | 256 | 4 5 | -0.7 4 |
| ## 96 | 0.2 | 0.0250877534 | 0.0304491954 | 1.18325834 | 578 | 4 5 | 1.0 0 |
| ## 97 | 0.2 | 0.4055508716 | 0.5908296843 | 0.86602746 | 315 | 4 5 | 0.8 1 |
| ## 98 | 0.2 | 0.4467035207 | 0.5975943271 | 0.74019304 | 283 | 4 5 | 0.3 2 |
| ## 99 | 0.2 | 0.3126913321 | 0.4610193319 | 1.01333984 | 293 | 4 5 | -0.2 3 |
| ## 100 | 0.2 | 0.0423727086 | 0.0511810522 | 1.15669671 | 286 | 4 5 | -0.8 4 |
| ## 101 | 0.4 | 0.3949315704 | 0.5083640227 | 0.77885650 | 582 | 4 5 | 1.0 0 |
| ## 102 | 0.4 | 0.2444088663 | 0.4177539081 | 1.29148813 | 261 | 4 5 | 0.8 1 |
| ## 103 | 0.4 | 0.2859188024 | 0.4837923046 | 1.20826957 | 276 | 4 5 | 0.3 2 |
| ## 104 | 0.4 | 0.5538722982 | 0.7793054521 | 0.62770742 | 285 | 4 5 | -0.2 3 |
| ## 105 | 0.4 | 0.4513406255 | 0.7413443106 | 0.90119409 | 255 | 4 5 | -0.7 4 |
| ## 106 | 0.6 | 0.7235184343 | 1.1864048327 | 0.45336656 | 611 | 4 5 | 1.0 0 |
| ## 107 | 0.6 | 0.3513217751 | 0.7036980656 | 1.29930350 | 296 | 4 5 | 0.8 1 |
| ## 108 | 0.6 | 0.3109422747 | 0.6132374710 | 1.35895326 | 274 | 4 5 | 0.3 2 |
| ## 109 | 0.6 | 0.3181800683 | 0.5535652941 | 1.18622091 | 293 | 4 5 | -0.2 3 |
| ## 110 | 0.6 | 0.6749911119 | 1.1673651690 | 0.56208748 | 250 | 4 5 | -0.7 4 |
| ## 111 | 0.8 | 0.5730078426 | 1.1228683419 | 0.83673545 | 600 | 4 5 | 1.0 0 |
| ## 112 | 0.8 | 0.5576730552 | 1.3290852090 | 1.05418434 | 290 | 4 5 | 0.8 1 |
| ## 113 | 0.8 | 0.5669827041 | 1.3161477096 | 1.00517127 | 299 | 4 5 | 0.3 2 |
| ## 114 | 0.8 | 0.6481918347 | 1.3720591508 | 0.74468944 | 296 | 4 5 | -0.2 3 |
| ## 115 | 0.8 | -0.1262487992 | -0.2350631887 | 2.09696754 | 307 | 4 5 | -0.8 4 |
| ## 116 | 1.0 | 0.4251459252 | 0.9672057313 | 1.30779133 | 562 | 4 5 | 1.0 0 |
| ## 117 | 1.0 | 0.2845643970 | 0.6710135007 | 1.68702393 | 286 | 4 5 | 0.8 1 |
| ## 118 | 1.0 | 0.9254112021 | 2.5049767958 | 0.20190290 | 297 | 4 5 | 0.3 2 |
| ## 119 | 1.0 | 0.6699646899 | 1.6683995757 | 0.82188029 | 257 | 4 5 | -0.1 3 |
| ## 120 | 1.0 | 0.9467022632 | 2.0089314414 | 0.11309944 | 267 | 4 5 | -0.7 4 |
| ## 121 | 0.0 | -0.0569903816 | -0.0581781849 | 1.07902036 | 588 | 5 5 | 1.0 0 |
| ## 122 | 0.0 | -0.1572969481 | -0.1393202923 | 1.02503546 | 295 | 5 5 | 0.8 1 |
| ## 123 | 0.0 | 0.2956371049 | 0.2729133264 | 0.65022292 | 274 | 5 5 | 0.3 2 |
| ## 124 | 0.0 | 0.4227311155 | 0.3637707892 | 0.49675444 | 278 | 5 5 | -0.2 3 |
| ## 125 | 0.0 | 0.3537108723 | 0.4322276148 | 0.78975239 | 297 | 5 5 | -0.8 4 |
| ## 126 | 0.2 | 0.2942170555 | 0.3576523887 | 0.85795487 | 585 | 5 5 | 1.0 0 |
| ## 127 | 0.2 | 0.0341638073 | 0.0427115477 | 1.20748716 | 281 | 5 5 | 0.8 1 |
| ## 128 | 0.2 | 0.4049150232 | 0.5300617519 | 0.77900737 | 252 | 5 5 | 0.4 2 |
| ## 129 | 0.2 | 0.3198986598 | 0.4169425192 | 0.88641561 | 301 | 5 5 | -0.2 3 |
| ## 130 | 0.2 | 0.2635404608 | 0.3327528067 | 0.92987232 | 255 | 5 5 | -0.7 4 |
| ## 131 | 0.4 | 0.1744641726 | 0.2873355044 | 1.35962444 | 578 | 5 5 | 1.0 0 |
| ## 132 | 0.4 | 0.3517245944 | 0.6061588785 | 1.11723177 | 308 | 5 5 | 0.8 1 |

| | | | | | | | | | |
|--------|-----|---------------|---------------|-------------|-----|---|---|------|---|
| ## 133 | 0.4 | 1.1011041911 | 2.0674397383 | -0.18983383 | 250 | 5 | 5 | 0.4 | 2 |
| ## 134 | 0.4 | 0.6644824189 | 1.0644562104 | 0.53747663 | 303 | 5 | 5 | -0.2 | 3 |
| ## 135 | 0.4 | 0.1363860948 | 0.1761369848 | 1.11532154 | 256 | 5 | 5 | -0.7 | 4 |
| ## 136 | 0.6 | 0.5556528414 | 0.9954542168 | 0.79604966 | 601 | 5 | 5 | 1.0 | 0 |
| ## 137 | 0.6 | 0.3767881816 | 0.6764572468 | 1.11886777 | 276 | 5 | 5 | 0.8 | 1 |
| ## 138 | 0.6 | 0.6207908986 | 1.2144692956 | 0.74185658 | 264 | 5 | 5 | 0.3 | 2 |
| ## 139 | 0.6 | 0.8720643992 | 1.8426469177 | 0.27032423 | 288 | 5 | 5 | -0.2 | 3 |
| ## 140 | 0.6 | 0.6421096835 | 1.1544980277 | 0.64347833 | 310 | 5 | 5 | -0.8 | 4 |
| ## 141 | 0.8 | 0.0004156602 | 0.0007908023 | 1.90173010 | 574 | 5 | 5 | 1.0 | 0 |
| ## 142 | 0.8 | 0.5262328530 | 1.0640668156 | 0.95797877 | 301 | 5 | 5 | 0.8 | 1 |
| ## 143 | 0.8 | 0.9177713589 | 2.1730819314 | 0.19469944 | 289 | 5 | 5 | 0.3 | 2 |
| ## 144 | 0.8 | 0.6923959465 | 1.5865781645 | 0.70485374 | 298 | 5 | 5 | -0.2 | 3 |
| ## 145 | 0.8 | 0.6235826018 | 1.2587424258 | 0.75982323 | 290 | 5 | 5 | -0.8 | 4 |
| ## 146 | 1.0 | 0.8348220784 | 2.0510527447 | 0.40582136 | 544 | 5 | 5 | 1.0 | 0 |
| ## 147 | 1.0 | 0.6993111509 | 1.6191231566 | 0.69618835 | 277 | 5 | 5 | 0.8 | 1 |
| ## 148 | 1.0 | 0.7794900152 | 2.0818464270 | 0.58893368 | 291 | 5 | 5 | 0.3 | 2 |
| ## 149 | 1.0 | 0.7447140982 | 1.7162693487 | 0.58833231 | 260 | 5 | 5 | -0.1 | 3 |
| ## 150 | 1.0 | 0.5192846078 | 1.1427397789 | 1.05786421 | 263 | 5 | 5 | -0.7 | 4 |
| ## 151 | 0.0 | -0.1660278705 | -0.1815473922 | 1.27502279 | 562 | 6 | 5 | 1.0 | 0 |
| ## 152 | 0.0 | 0.0628471728 | 0.0580318671 | 0.86534884 | 286 | 6 | 5 | 0.8 | 1 |
| ## 153 | 0.0 | 0.0035844470 | 0.0035974186 | 1.00002143 | 270 | 6 | 5 | 0.3 | 2 |
| ## 154 | 0.0 | -0.0444506770 | -0.0435749307 | 1.02387340 | 259 | 6 | 5 | -0.1 | 3 |
| ## 155 | 0.0 | -0.0299485804 | -0.0279094851 | 0.95982294 | 288 | 6 | 5 | -0.8 | 4 |
| ## 156 | 0.2 | 0.1767284177 | 0.2010377189 | 0.93651402 | 541 | 6 | 5 | 1.0 | 0 |
| ## 157 | 0.2 | 0.0106276961 | 0.0144691732 | 1.34698990 | 293 | 6 | 5 | 0.8 | 1 |
| ## 158 | 0.2 | 0.5623522650 | 0.8210307115 | 0.63896289 | 280 | 6 | 5 | 0.3 | 2 |
| ## 159 | 0.2 | 0.4734133244 | 0.6713291587 | 0.74673224 | 268 | 6 | 5 | -0.1 | 3 |
| ## 160 | 0.2 | 0.1887476336 | 0.2515261018 | 1.08107922 | 260 | 6 | 5 | -0.7 | 4 |
| ## 161 | 0.4 | 0.6327585663 | 0.9946531835 | 0.57727841 | 574 | 6 | 5 | 1.0 | 0 |
| ## 162 | 0.4 | 0.2060639185 | 0.2597791977 | 1.00089370 | 293 | 6 | 5 | 0.8 | 1 |
| ## 163 | 0.4 | 0.4613801896 | 0.7973245515 | 0.93080459 | 281 | 6 | 5 | 0.3 | 2 |
| ## 164 | 0.4 | 0.6252327624 | 1.1109204198 | 0.66589053 | 289 | 6 | 5 | -0.2 | 3 |
| ## 165 | 0.4 | 0.3470913253 | 0.4985762062 | 0.93786478 | 301 | 6 | 5 | -0.8 | 4 |
| ## 166 | 0.6 | 0.5790903137 | 1.1712729734 | 0.85133550 | 570 | 6 | 5 | 1.0 | 0 |
| ## 167 | 0.6 | 0.6762885046 | 1.0600130343 | 0.50738465 | 259 | 6 | 5 | 0.9 | 1 |
| ## 168 | 0.6 | 0.9829430209 | 1.9264126825 | 0.03342898 | 269 | 6 | 5 | 0.3 | 2 |
| ## 169 | 0.6 | 0.2330427285 | 0.4645587354 | 1.52889001 | 312 | 6 | 5 | -0.2 | 3 |
| ## 170 | 0.6 | 0.4537132868 | 0.7776957913 | 0.93637301 | 289 | 6 | 5 | -0.8 | 4 |
| ## 171 | 0.8 | 0.5961003992 | 1.2209529539 | 0.82728079 | 585 | 6 | 5 | 1.0 | 0 |
| ## 172 | 0.8 | 0.7330011683 | 1.6132761141 | 0.58764277 | 279 | 6 | 5 | 0.8 | 1 |
| ## 173 | 0.8 | 0.7936102073 | 1.7902148299 | 0.46557121 | 299 | 6 | 5 | 0.3 | 2 |
| ## 174 | 0.8 | 0.5695175366 | 1.2542702480 | 0.94806799 | 262 | 6 | 5 | -0.1 | 3 |
| ## 175 | 0.8 | 0.3384435080 | 0.5598616979 | 1.09436326 | 256 | 6 | 5 | -0.7 | 4 |
| ## 176 | 1.0 | 0.7586401406 | 1.6473926719 | 0.52411472 | 577 | 6 | 5 | 1.0 | 0 |
| ## 177 | 1.0 | 0.7202720575 | 1.6576455131 | 0.64377031 | 284 | 6 | 5 | 0.8 | 1 |
| ## 178 | 1.0 | 0.5526463565 | 1.3828522538 | 1.11938491 | 294 | 6 | 5 | 0.3 | 2 |
| ## 179 | 1.0 | 0.8519686939 | 2.2273699220 | 0.38701009 | 299 | 6 | 5 | -0.2 | 3 |
| ## 180 | 1.0 | 0.5705835159 | 1.2486472266 | 0.93972168 | 255 | 6 | 5 | -0.7 | 4 |
| ## 181 | 0.0 | -0.0902476133 | -0.0987779444 | 1.19329935 | 553 | 7 | 5 | 1.0 | 0 |
| ## 182 | 0.0 | -0.2729680302 | -0.2718169164 | 1.26759989 | 285 | 7 | 5 | 0.8 | 1 |
| ## 183 | 0.0 | -0.2607195870 | -0.2347261072 | 1.13502712 | 298 | 7 | 5 | 0.3 | 2 |
| ## 184 | 0.0 | 0.0861984726 | 0.0855848990 | 0.90729695 | 271 | 7 | 5 | -0.2 | 3 |
| ## 185 | 0.0 | 0.0257468354 | 0.0222591340 | 0.84227950 | 256 | 7 | 5 | -0.7 | 4 |
| ## 186 | 0.2 | 0.2309083442 | 0.2952995419 | 0.98356088 | 607 | 7 | 5 | 1.0 | 0 |

| | | | | | | | | | |
|--------|-----|---------------|---------------|-------------|-----|---|---|------|---|
| ## 187 | 0.2 | 0.1609637376 | 0.1897438956 | 0.98905512 | 289 | 7 | 5 | 0.8 | 1 |
| ## 188 | 0.2 | 0.6916815293 | 0.9873782416 | 0.44012589 | 286 | 7 | 5 | 0.3 | 2 |
| ## 189 | 0.2 | 0.1974233634 | 0.2578021081 | 1.04803173 | 286 | 7 | 5 | -0.2 | 3 |
| ## 190 | 0.2 | 0.3862027659 | 0.5481769139 | 0.87122492 | 262 | 7 | 5 | -0.7 | 4 |
| ## 191 | 0.4 | 0.6507420841 | 1.1674145426 | 0.62655971 | 611 | 7 | 5 | 1.0 | 0 |
| ## 192 | 0.4 | 0.7979134367 | 1.2826304729 | 0.32485026 | 291 | 7 | 5 | 0.8 | 1 |
| ## 193 | 0.4 | 0.4440131268 | 0.7579000406 | 0.94903157 | 274 | 7 | 5 | 0.3 | 2 |
| ## 194 | 0.4 | 0.6182332777 | 1.0768475245 | 0.66496671 | 257 | 7 | 5 | -0.1 | 3 |
| ## 195 | 0.4 | 0.7848173883 | 1.2208886002 | 0.33474538 | 292 | 7 | 5 | -0.8 | 4 |
| ## 196 | 0.6 | 0.2827494394 | 0.4644998328 | 1.17829682 | 593 | 7 | 5 | 1.0 | 0 |
| ## 197 | 0.6 | 0.4113516993 | 0.7353463759 | 1.05228785 | 285 | 7 | 5 | 0.8 | 1 |
| ## 198 | 0.6 | 0.8290660362 | 1.6278623208 | 0.33562701 | 282 | 7 | 5 | 0.3 | 2 |
| ## 199 | 0.6 | 0.2413032592 | 0.4240564139 | 1.33330242 | 303 | 7 | 5 | -0.2 | 3 |
| ## 200 | 0.6 | 0.5666785844 | 0.9091149538 | 0.69517181 | 299 | 7 | 5 | -0.8 | 4 |
| ## 201 | 0.8 | 0.7463042462 | 1.3330668005 | 0.45315753 | 551 | 7 | 5 | 1.0 | 0 |
| ## 202 | 0.8 | 0.7702020226 | 1.5754152178 | 0.47004191 | 265 | 7 | 5 | 0.8 | 1 |
| ## 203 | 0.8 | 0.7458177019 | 1.7077716801 | 0.58202605 | 306 | 7 | 5 | 0.3 | 2 |
| ## 204 | 0.8 | 0.6096546688 | 1.2574331244 | 0.80510029 | 309 | 7 | 5 | -0.2 | 3 |
| ## 205 | 0.8 | 0.6847190998 | 1.3779428244 | 0.63447778 | 291 | 7 | 5 | -0.8 | 4 |
| ## 206 | 1.0 | 0.3269400284 | 0.6379938034 | 1.31341547 | 612 | 7 | 5 | 1.0 | 0 |
| ## 207 | 1.0 | 0.6026446581 | 1.2911103286 | 0.85129699 | 258 | 7 | 5 | 0.8 | 1 |
| ## 208 | 1.0 | 0.7211316371 | 1.8474595576 | 0.71442993 | 265 | 7 | 5 | 0.3 | 2 |
| ## 209 | 1.0 | 0.9257606213 | 2.3127169191 | 0.18546335 | 313 | 7 | 5 | -0.2 | 3 |
| ## 210 | 1.0 | 1.2601857986 | 2.7144058934 | -0.56043312 | 272 | 7 | 5 | -0.8 | 4 |
| ## 211 | 0.0 | -0.3485001446 | -0.3440919021 | 1.33144272 | 596 | 8 | 5 | 1.0 | 0 |
| ## 212 | 0.0 | 0.0039052441 | 0.0037628173 | 0.95976653 | 286 | 8 | 5 | 0.8 | 1 |
| ## 213 | 0.0 | -0.1035826844 | -0.1031358653 | 1.09882222 | 291 | 8 | 5 | 0.3 | 2 |
| ## 214 | 0.0 | 0.1767480119 | 0.1783105229 | 0.83052981 | 250 | 8 | 5 | -0.1 | 3 |
| ## 215 | 0.0 | 0.0018289247 | 0.0018716269 | 1.02147662 | 300 | 8 | 5 | -0.8 | 4 |
| ## 216 | 0.2 | 0.8673480991 | 1.2586595440 | 0.19249893 | 575 | 8 | 5 | 1.0 | 0 |
| ## 217 | 0.2 | 0.5379254811 | 0.7548257973 | 0.64839049 | 274 | 8 | 5 | 0.8 | 1 |
| ## 218 | 0.2 | -0.2297382875 | -0.2985920487 | 1.59829726 | 297 | 8 | 5 | 0.3 | 2 |
| ## 219 | 0.2 | 0.2197565133 | 0.3324263699 | 1.18027678 | 270 | 8 | 5 | -0.1 | 3 |
| ## 220 | 0.2 | -0.0375252582 | -0.0422812182 | 1.16902145 | 268 | 8 | 5 | -0.7 | 4 |
| ## 221 | 0.4 | 0.3257708492 | 0.4590102162 | 0.94998699 | 594 | 8 | 5 | 1.0 | 0 |
| ## 222 | 0.4 | 0.1415811585 | 0.1883604991 | 1.14204604 | 266 | 8 | 5 | 0.8 | 1 |
| ## 223 | 0.4 | 0.4613479177 | 0.7403642197 | 0.86442078 | 288 | 8 | 5 | 0.3 | 2 |
| ## 224 | 0.4 | 0.2060992915 | 0.3194134699 | 1.23039035 | 309 | 8 | 5 | -0.2 | 3 |
| ## 225 | 0.4 | 0.6887006345 | 1.0400910513 | 0.47013124 | 254 | 8 | 5 | -0.7 | 4 |
| ## 226 | 0.6 | 0.5904484822 | 1.0148701341 | 0.70394220 | 590 | 8 | 5 | 1.0 | 0 |
| ## 227 | 0.6 | 0.6393111713 | 1.0436775083 | 0.58882565 | 281 | 8 | 5 | 0.8 | 1 |
| ## 228 | 0.6 | 0.9079691615 | 1.8388403625 | 0.18638300 | 295 | 8 | 5 | 0.3 | 2 |
| ## 229 | 0.6 | 0.7065977701 | 1.2927079320 | 0.53677411 | 304 | 8 | 5 | -0.2 | 3 |
| ## 230 | 0.6 | 0.6912563343 | 1.1660899674 | 0.52082400 | 257 | 8 | 5 | -0.7 | 4 |
| ## 231 | 0.8 | 0.6145234656 | 1.0727815085 | 0.67293134 | 583 | 8 | 5 | 1.0 | 0 |
| ## 232 | 0.8 | 0.5347766135 | 1.0445914745 | 0.90873155 | 272 | 8 | 5 | 0.8 | 1 |
| ## 233 | 0.8 | 0.5832742359 | 1.1638880648 | 0.83155078 | 316 | 8 | 5 | 0.2 | 2 |
| ## 234 | 0.8 | 0.3538011548 | 0.8020897549 | 1.46497394 | 306 | 8 | 5 | -0.2 | 3 |
| ## 235 | 0.8 | 1.0422192627 | 1.9089143693 | -0.07732822 | 260 | 8 | 5 | -0.7 | 4 |
| ## 236 | 1.0 | 0.6159564805 | 1.4539420347 | 0.90652024 | 572 | 8 | 5 | 1.0 | 0 |
| ## 237 | 1.0 | 0.8471884363 | 2.0533918373 | 0.37038043 | 269 | 8 | 5 | 0.8 | 1 |
| ## 238 | 1.0 | 0.7528262809 | 1.9081408743 | 0.62649550 | 292 | 8 | 5 | 0.3 | 2 |
| ## 239 | 1.0 | 0.9027342060 | 1.9586299185 | 0.21103409 | 272 | 8 | 5 | -0.2 | 3 |
| ## 240 | 1.0 | 0.6184744740 | 1.4456950077 | 0.89182266 | 297 | 8 | 5 | -0.8 | 4 |

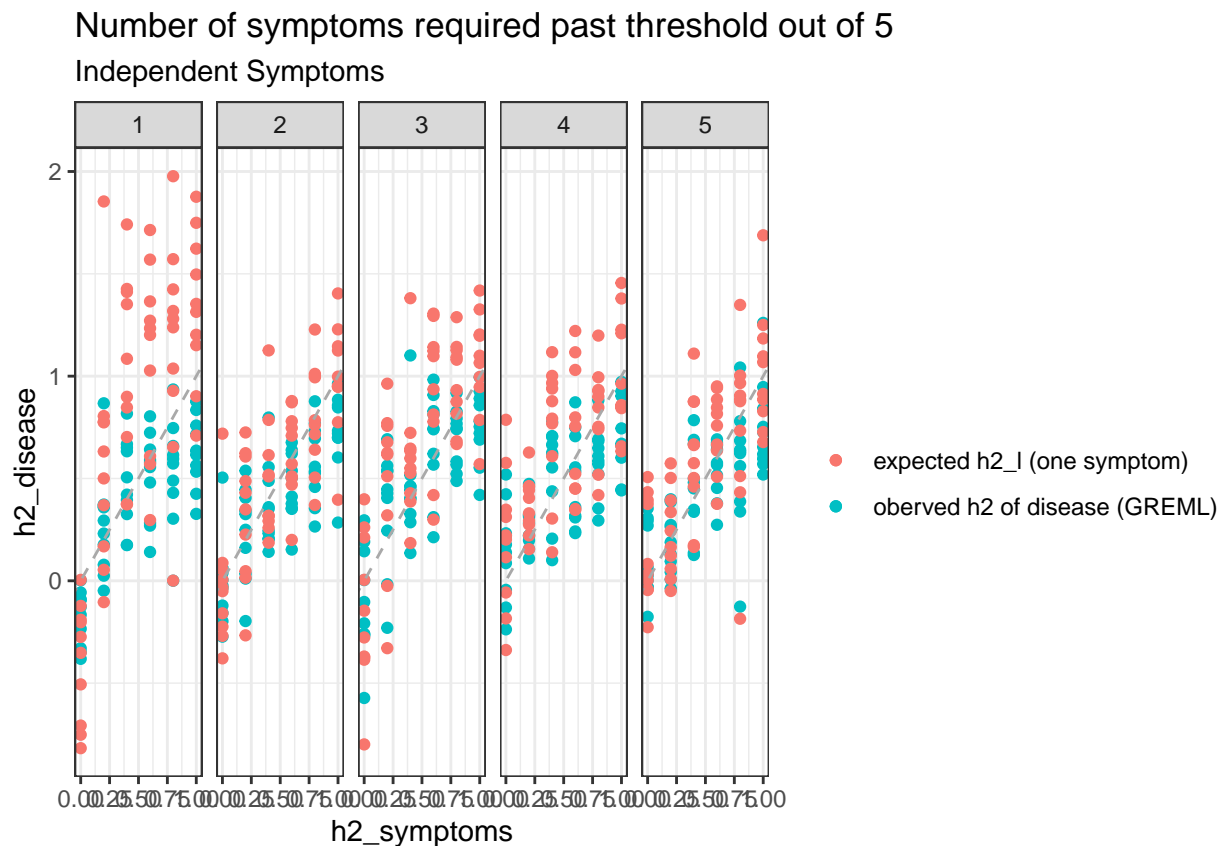
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|--------|-----|---------------|---------------|------------|-----|------|--------|
| ## 241 | 0.0 | 0.0021040172 | 0.0022158212 | 1.05092252 | 573 | 9 5 | 1.0 0 |
| ## 242 | 0.0 | -0.0358282627 | -0.0342156326 | 0.98920563 | 291 | 9 5 | 0.8 1 |
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| ## 245 | 0.0 | 0.0647757168 | 0.0598795771 | 0.86453439 | 254 | 9 5 | -0.7 4 |
| ## 246 | 0.2 | 0.3726225023 | 0.4502357165 | 0.75805341 | 598 | 9 5 | 1.0 0 |
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| ## 250 | 0.2 | 0.0948677298 | 0.1232059787 | 1.17550728 | 259 | 9 5 | -0.7 4 |
| ## 251 | 0.4 | 0.8170542151 | 1.3605200743 | 0.30463268 | 570 | 9 5 | 1.0 0 |
| ## 252 | 0.4 | 0.2044737321 | 0.3205383418 | 1.24708767 | 253 | 9 5 | 0.8 1 |
| ## 253 | 0.4 | 0.3267692028 | 0.5363362965 | 1.10499432 | 264 | 9 5 | 0.3 2 |
| ## 254 | 0.4 | 0.7757207977 | 1.2898928176 | 0.37293848 | 299 | 9 5 | -0.2 3 |
| ## 255 | 0.4 | 0.4801379903 | 0.7487836511 | 0.81073396 | 285 | 9 5 | -0.8 4 |
| ## 256 | 0.6 | 0.1407293054 | 0.2422392444 | 1.47907419 | 553 | 9 5 | 1.0 0 |
| ## 257 | 0.6 | 0.6217999081 | 1.0845662520 | 0.65967050 | 250 | 9 5 | 0.9 1 |
| ## 258 | 0.6 | 0.7438322305 | 1.4575295127 | 0.50195739 | 251 | 9 5 | 0.4 2 |
| ## 259 | 0.6 | 0.5362442500 | 1.0760974555 | 0.93063260 | 290 | 9 5 | -0.2 3 |
| ## 260 | 0.6 | 0.5163027226 | 0.8622068175 | 0.80775691 | 259 | 9 5 | -0.7 4 |
| ## 261 | 0.8 | 0.4895226671 | 0.9521926823 | 0.99295255 | 560 | 9 5 | 1.0 0 |
| ## 262 | 0.8 | 0.8771513369 | 1.8507719996 | 0.25920825 | 288 | 9 5 | 0.8 1 |
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| ## 266 | 1.0 | 0.8758304171 | 1.8250813787 | 0.25874826 | 580 | 9 5 | 1.0 0 |
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| ## 268 | 1.0 | 0.8575830821 | 2.1719394880 | 0.36068917 | 287 | 9 5 | 0.3 2 |
| ## 269 | 1.0 | 0.4416021655 | 1.1692838403 | 1.47853796 | 297 | 9 5 | -0.2 3 |
| ## 270 | 1.0 | 0.5967012068 | 1.3145561491 | 0.88848305 | 285 | 9 5 | -0.7 4 |
| ## 271 | 0.0 | -0.1278490433 | -0.1493658099 | 1.31766403 | 580 | 10 5 | 1.0 0 |
| ## 272 | 0.0 | -0.1974998527 | -0.1746059201 | 1.05868719 | 278 | 10 5 | 0.8 1 |
| ## 273 | 0.0 | -0.2078818873 | -0.2471747798 | 1.43619025 | 270 | 10 5 | 0.3 2 |
| ## 274 | 0.0 | 0.1388219222 | 0.1332310634 | 0.82649533 | 302 | 10 5 | -0.2 3 |
| ## 275 | 0.0 | -0.0324822350 | -0.0332050387 | 1.05545731 | 284 | 10 5 | -0.7 4 |
| ## 276 | 0.2 | 0.3586481723 | 0.5737216821 | 1.02595657 | 596 | 10 5 | 1.0 0 |
| ## 277 | 0.2 | 0.3418309443 | 0.4288790436 | 0.82577344 | 295 | 10 5 | 0.8 1 |
| ## 278 | 0.2 | 0.2451027115 | 0.3034066348 | 0.93446884 | 263 | 10 5 | 0.3 2 |
| ## 279 | 0.2 | 0.3231925477 | 0.4061806571 | 0.85059540 | 294 | 10 5 | -0.2 3 |
| ## 280 | 0.2 | 0.0064045149 | 0.0080348014 | 1.24651789 | 265 | 10 5 | -0.7 4 |
| ## 281 | 0.4 | 0.5055650524 | 0.8035777894 | 0.78588688 | 583 | 10 5 | 1.0 0 |
| ## 282 | 0.4 | 0.2312883370 | 0.3643067698 | 1.21081273 | 281 | 10 5 | 0.8 1 |
| ## 283 | 0.4 | 0.4046481925 | 0.5715538851 | 0.84091723 | 277 | 10 5 | 0.3 2 |
| ## 284 | 0.4 | 0.1007476070 | 0.1786644995 | 1.59472253 | 284 | 10 5 | -0.2 3 |
| ## 285 | 0.4 | 0.3369690271 | 0.4697254723 | 0.92424678 | 279 | 10 5 | -0.8 4 |
| ## 286 | 0.6 | 0.2695365994 | 0.4560750689 | 1.23599595 | 558 | 10 5 | 1.0 0 |
| ## 287 | 0.6 | 0.5378734933 | 0.9663957598 | 0.83030137 | 285 | 10 5 | 0.8 1 |
| ## 288 | 0.6 | 0.7401130541 | 1.4573992188 | 0.51175835 | 311 | 10 5 | 0.3 2 |
| ## 289 | 0.6 | 0.3603896430 | 0.6140995315 | 1.08988820 | 302 | 10 5 | -0.2 3 |
| ## 290 | 0.6 | 0.5761481307 | 1.0201288355 | 0.75047282 | 266 | 10 5 | -0.8 4 |
| ## 291 | 0.8 | 0.4297857756 | 0.8610233009 | 1.14235454 | 598 | 10 5 | 1.0 0 |
| ## 292 | 0.8 | 0.4587335366 | 0.9538646147 | 1.12547892 | 287 | 10 5 | 0.8 1 |
| ## 293 | 0.8 | 0.5224238321 | 1.2168582609 | 1.11239662 | 263 | 10 5 | 0.3 2 |
| ## 294 | 0.8 | 0.5852446299 | 1.3129664006 | 0.93048246 | 301 | 10 5 | -0.2 3 |

```
## 295      0.8  0.6321275903  1.2635516389  0.73533539  288  10  5 -0.8  4
## 296      1.0  0.7158759441  1.6029967652  0.63621350  541  10  5  1.0  0
## 297      1.0  0.8847668123  2.1639903948  0.28184094  285  10  5  0.8  1
## 298      1.0  0.8907945885  2.2642212516  0.27757826  275  10  5  0.3  2
## 299      1.0  0.6015523102  1.4711315466  0.97442725  293  10  5 -0.2  3
## 300      1.0  0.7521965667  1.6445257781  0.54177213  304  10  5 -0.8  4
```

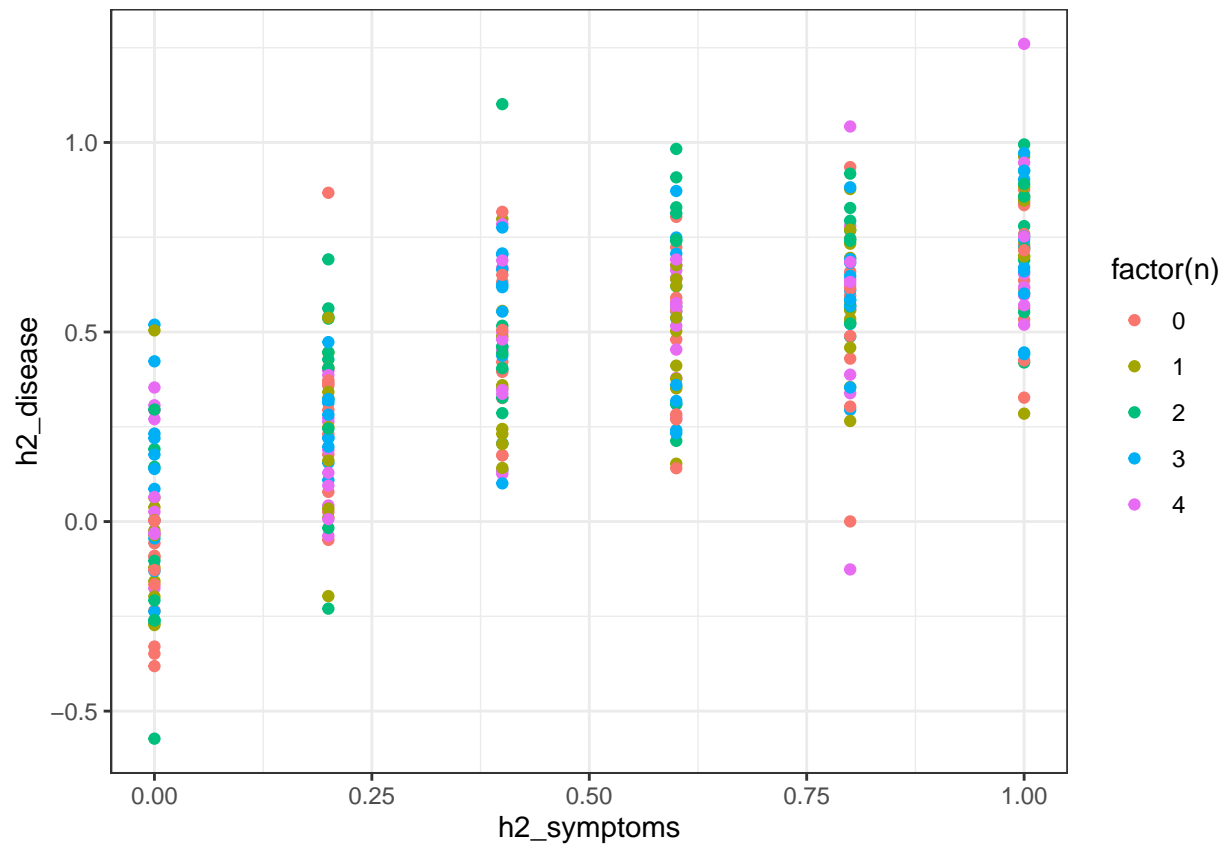
```
rows_n <- rows_n %>% mutate(h2_l = h2_disease * (prev/N) * (1-prev/N) / dnorm(prev/N)^2)
```

How is disease heritability affected by the number of symptoms required past a threshold for the disease - for a given number of symptoms?

```
ggplot(rows_n, aes(x=h2_symptoms, y=h2_disease)) +
  geom_point(aes(col="observed h2 of disease (GREML)")) +
  geom_point(aes(y=h2_l, col="expected h2_l (one symptom)")) +
  geom_abline(slope=1, intercept=0, lty=2, col="darkgrey") +
  facet_wrap(~(n+1), nrow=1) +
  labs(title = paste("Number of symptoms required past threshold out of", p),
       col="",
       subtitle = "Independent Symptoms")
```

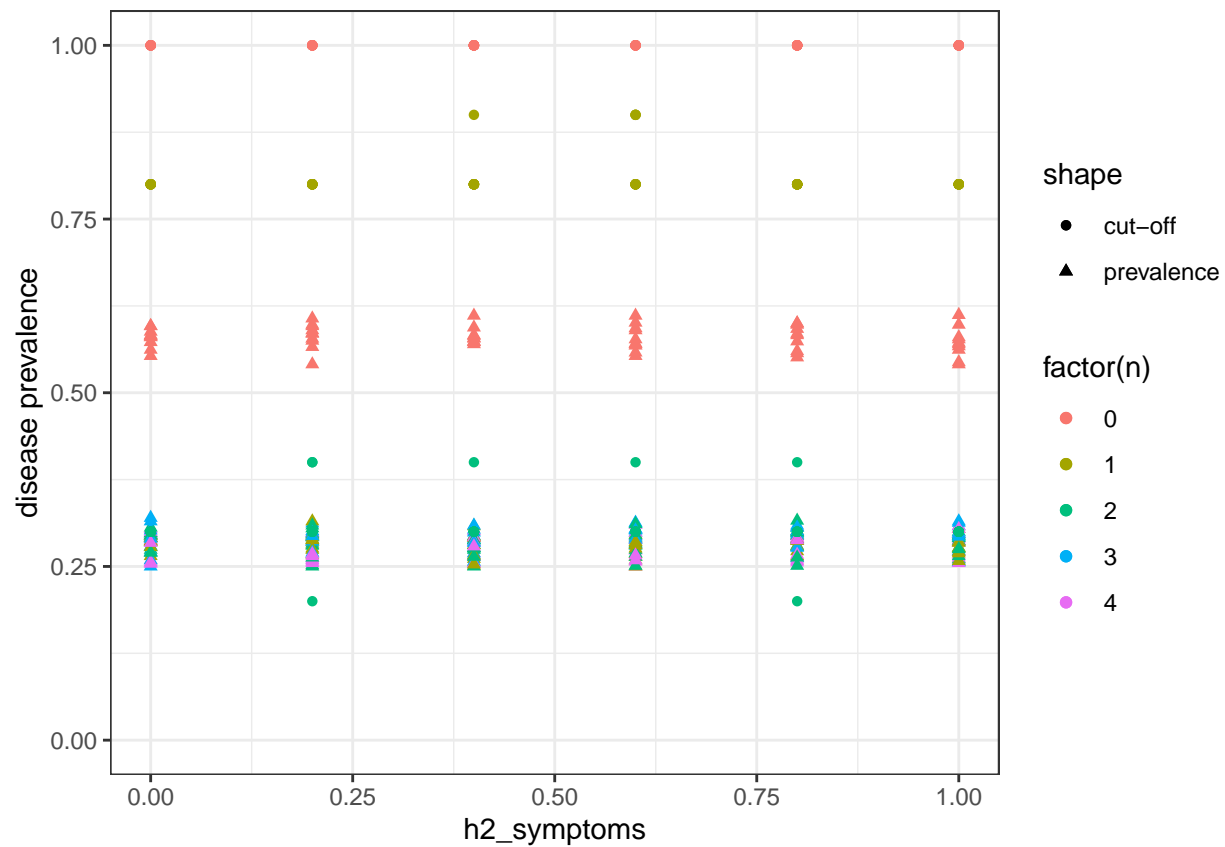


```
ggplot(rows_n,aes(x=h2_symptoms,y=h2_disease)) +  
  geom_point(aes(col=factor(n)) )
```

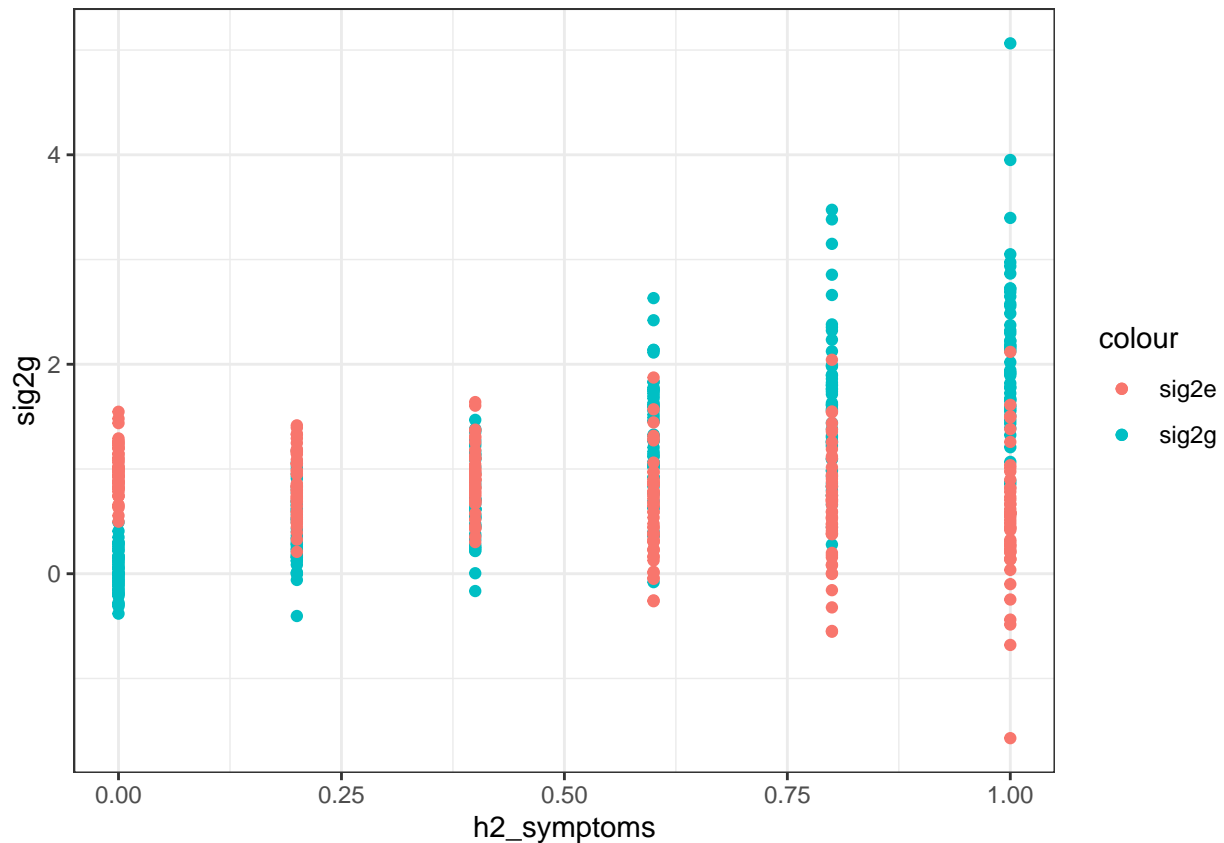


```
ggplot(rows_n,aes(x=h2_symptoms,y=prev/N,col=factor(n))) +  
  geom_point(aes(shape="prevalence")) +  
  labs(y="disease prevalence") +  
  geom_point(aes(y=c,shape="cut-off")) +  
  lims(y=c(0,1))
```

```
## Warning: Removed 120 rows containing missing values ('geom_point()').
```

```
ggplot(rows,aes(x=h2_symptoms,y=sig2g)) +
  geom_point(aes(col="sig2g")) +
  geom_point(aes(y=sig2e,col="sig2e"))
```



Slightly less null model: MDD is a function of symptoms, symptoms have a fixed covariance structure

```
# generate a random covariance matrix for symptoms
c <- 0.3
Sigma <- matrix(sample(x=c(0,c),size=P * P,replace=TRUE),byrow = T,ncol=P) # draw covariances
diag(Sigma) <- 1 # set diagonal
Sigma[lower.tri(Sigma)] = t(Sigma)[lower.tri(Sigma)] # make symmetric

# print av of correlations

rows_2 <- data.frame()

for (r in c(1:reps)){
  for (her in heritabilities){
    G <- simulate_genotypes(N = N,L = 1)
    G <- scale(G)
    beta <- matrix(mvrnorm(n=1,mu = rep(0,P),Sigma = Sigma),nrow=1) %*% diag(1,P,P) * sqrt(her / 1)
    e <- matrix(mvrnorm(n=N,mu = rep(0,P),Sigma = Sigma),nrow=N) * sqrt(1-her)

    X <- G %*% beta + e
    Y <- apply(X,1,mdd_risk,threshold=0)
```

```

res <- greml(Y,G)
h2 <- res$h2

rows_2 <- rbind(rows_2,data.frame("h2_symptoms"=her,
                                "h2_disease"=h2,
                                "sig2g"=res$sig2g,
                                "sig2e"=res$sig2e,
                                "prev"=sum(Y),
                                "rep"=r))
}
}

rows_2

```

```

ggplot(rows,aes(x=h2_symptoms,y=h2_disease)) +
  geom_point() +
  geom_point(data=rows_2,col="orchid",shape=1)

```

Our model: MDD is a function of symptoms, covariance structure variable among individuals

Genetic effects on entries of covariance matrix directly.

```

rows_3 <- data.frame()

num_covariances <- (P^2-P)/2 +P

for (r in c(1:reps)){
  for (her in heritabilities){
    for (hercov in cov_heritabilities){
      G <- simulate_genotypes(N = N,L = 1)
      G <- scale(G)

      beta_cov <- matrix(rnorm(num_covariances * 1),nrow=1) %%% diag(1,num_covariances,num_covariances)
      e_cov <- matrix(rnorm(N * num_covariances),nrow=N) * sqrt(1-hercov)
      covs <- G %%% beta_cov + e_cov

      beta <- matrix(rnorm(P * 1),nrow=1) %%% diag(1,P,P) * sqrt(her / 1)
      e <- matrix(rnorm(P * N),nrow=N) * sqrt(1-her)

      X <- matrix(0,nrow=N,ncol=P)

      sig_gg_vecs <- G %%% beta_cov
      #sig_from_row(sig_gg_vecs,1,P) / 100 + Sigma
      for (ind in c(1:N)){
        # make into matrix
        sig_gg_mat <- matrix(0,P,P)
        sig_gg_mat[lower.tri(sig_gg_mat,diag=FALSE)] <- sig_gg_vec
        sig_gg_mat[upper.tri(sig_gg_mat)] <- t(sig_gg_mat)[upper.tri(sig_gg_mat)]
      }
    }
  }
}

```

```

sig_ee_vec <- e_cov[ind,]
sig_ee_mat <- matrix(0,P,P)
sig_ee_mat[lower.tri(sig_ee_mat,diag=FALSE)] <- sig_ee_vec
sig_ee_mat[upper.tri(sig_ee_mat)] <- t(sig_ee_mat)[upper.tri(sig_ee_mat)]

Sig_ind <- Sigma + sig_gg_mat/100 + sig_ee_mat/100 # change scaling constant?
# print(sum(eigen(Sig_ind)$values<0)==0)
beta_transformed <- beta %*% t(chol(Sig_ind)) # check this
e_transformed <- e[ind,] %*% t(chol(Sig_ind)) # check this
X[ind,] <- G[ind,] %*% beta_transformed + e_transformed
print(Sig_ind)
}

Y <- apply(X,1,mdd_risk,threshold=0)

res <- greml(Y,G)
h2 <- res$h2

rows_3 <- rbind(rows_3,data.frame("h2_symptoms"=her,
                                "h2_disease"=h2,
                                "h2_covariance"=hercov,
                                "sig2g"=res$sig2g,
                                "sig2e"=res$sig2e,
                                "prev"=sum(Y),
                                "rep"=r))

}
}
}

rows_3

```

```

rows_3 <- data.frame()
cov_heritabilities <- seq(0,1,0.2)
num_covariances <- (P^2-P)/2 +P
reps <- 5

for (r in c(1:reps)){
  for (her in heritabilities){
    for (hercov in cov_heritabilities){
      print(paste(r,her,hercov))
      G <- simulate_genotypes(N = N,L = 1)
      G <- scale(G)

      beta_cov <- matrix(rnorm(num_covariances * 1),nrow=1) %*%
        diag(1,num_covariances,num_covariances) * sqrt(hercov / 1)
      e_cov <- matrix(rnorm(N * num_covariances),nrow=N) * sqrt(1-hercov)
      covs <- G %*% beta_cov + e_cov

      beta <- matrix(rnorm(P * 1),nrow=1) %*% diag(1,P,P) * sqrt(her / 1)
    }
  }
}

```

```

e <- matrix(rnorm(P * N),nrow=N) * sqrt(1-her)

X <- matrix(0,nrow=N,ncol=P)

sig_gg_vecs <- G %%% beta_cov

for (ind in c(1:N)){
  # make into matrix
  Sig_ind <- sig_from_row(sig_gg_vecs,ind,P) / 20 + sig_from_row(e_cov,ind,P) / 20 + Sigma
  eigs <- eigen(Sig_ind)
  eig_vals <- eigs$values
  eig_vecs <- eigs$vectors
  if (sum(eig_vals < 0) > 0) {
    print("Invalid covariance matrix")
    eig_vals[eig_vals < 0] <- 0.01 # Replace negative eigenvalues with a small positive value
    Sig_ind <- eig_vecs %%% diag(eig_vals) %%% t(eig_vecs)
  }
  #
  beta_transformed <- beta %%% t(chol(Sig_ind)) # check this
  e_transformed <- e[ind,] %%% t(chol(Sig_ind)) # check this
  X[ind,] <- G[ind,] %%% beta_transformed + e_transformed
}

Y <- apply(X,1,mdd_risk,threshold=0)

res <- greml(Y,G)
h2 <- res$h2

rows_3 <- rbind(rows_3,data.frame("h2_symptoms"=her,
                                "h2_disease"=h2,
                                "h2_covariance"=hercov,
                                "sig2g"=res$sig2g,
                                "sig2e"=res$sig2e,
                                "prev"=sum(Y),
                                "rep"=r))

}
}
}

```

```
## [1] "1 0 0"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

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## [1] "1 0 0.4"

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## Lam.K, : NA/Inf replaced by maximum positive value

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```



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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0 0.6"

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## Lam.K, : NA/Inf replaced by maximum positive value

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[illegible]

[illegible]

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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0 0.8"

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.2 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.2 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.4 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.4 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## [1] "1 0.4 0.8"  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.4 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.6 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.6 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.6 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.6 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.6 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.6 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 0.8 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "1 0.8 0.4"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "1 0.8 0.6"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 1 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 1 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## [1] "1 1 0.6"  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]


```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 1 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "1 1 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]


```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "2 0.2 0.2"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "2 0.2 0.6"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]


```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.4 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.4 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.4 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.4 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.4 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.4 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.6 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.6 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.6 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.6 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.6 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "2 0.8 0.4"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]


```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 0.8 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 1 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 1 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 1 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 1 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "2 1 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "3 0 1"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "3 0.2 0"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "3 0.2 0.2"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.2 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.2 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.4 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.4 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.4 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.4 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.4 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.4 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.6 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.6 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.6 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "3 0.6 1"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "3 0.8 0"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.8 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 0.8 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 1 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```



```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 1 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 1 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 1 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 1 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "3 1 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]


```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "4 0 0.8"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```

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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]


```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "4 0 1"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]


```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.2 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.2 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## [1] "4 0.2 0.8"  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.2 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.4 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.4 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.4 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.4 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.4 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.4 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.6 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```


[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "4 0.6 0.4"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "4 0.6 0.6"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```
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## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "4 0.6 0.8"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value
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## Lam.K, : NA/Inf replaced by maximum positive value
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.8 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.8 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.8 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 0.8 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
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## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 1 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 1 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 1 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
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## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 1 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 1 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "4 1 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "5 0 0.2"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "5 0 0.4"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
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```
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```
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## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "5 0 0.6"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.2 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.2 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## [1] "5 0.2 0.4"  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.2 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.2 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.4 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.4 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.4 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]


```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.4 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```



```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K. : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K. : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam_K): NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam_K = NA) Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.4 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "5 0.4 1"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "5 0.6 0"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "5 0.6 0.2"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```


[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```

## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.6 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]


```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.8 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## [1] "5 0.8 0.2"  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]


```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.8 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```



```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.8 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]


```
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_plus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value  
  
## Warning in optimise(eigen_lmm_obj, opt_limbs_minus, maximum = TRUE, Lam.K =  
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.8 0.8"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 0.8 1"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 1 0"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 1 0.2"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
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## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 1 0.4"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

```

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## [1] "5 1 0.6"

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value

```

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## [1] "5 1 1"
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_plus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

[illegible]

[illegible]

[illegible]

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
## Warning in optimise(eigen_lmm_obj, opt_lims_minus, maximum = TRUE, Lam.K =
## Lam.K, : NA/Inf replaced by maximum positive value
```

```
rows_3
```

| ## | h2_symptoms | h2_disease | h2_covariance | sig2g | sig2e | prev | rep |
|-------|-------------|------------|---------------|-------|-------|------|-----|
| ## 1 | 0.0 | NaN | 0.0 | NaN | NA | 0 | 1 |
| ## 2 | 0.0 | NaN | 0.2 | NaN | NA | 0 | 1 |
| ## 3 | 0.0 | NaN | 0.4 | NaN | NA | 0 | 1 |
| ## 4 | 0.0 | NaN | 0.6 | NaN | NA | 0 | 1 |
| ## 5 | 0.0 | NaN | 0.8 | NaN | NA | 0 | 1 |
| ## 6 | 0.0 | NaN | 1.0 | NaN | NA | 0 | 1 |
| ## 7 | 0.2 | NaN | 0.0 | NaN | NA | 0 | 1 |
| ## 8 | 0.2 | NaN | 0.2 | NaN | NA | 0 | 1 |
| ## 9 | 0.2 | NaN | 0.4 | NaN | NA | 0 | 1 |
| ## 10 | 0.2 | NaN | 0.6 | NaN | NA | 0 | 1 |
| ## 11 | 0.2 | NaN | 0.8 | NaN | NA | 0 | 1 |
| ## 12 | 0.2 | NaN | 1.0 | NaN | NA | 0 | 1 |
| ## 13 | 0.4 | NaN | 0.0 | NaN | NA | 0 | 1 |
| ## 14 | 0.4 | NaN | 0.2 | NaN | NA | 0 | 1 |
| ## 15 | 0.4 | NaN | 0.4 | NaN | NA | 0 | 1 |
| ## 16 | 0.4 | NaN | 0.6 | NaN | NA | 0 | 1 |
| ## 17 | 0.4 | NaN | 0.8 | NaN | NA | 0 | 1 |
| ## 18 | 0.4 | NaN | 1.0 | NaN | NA | 0 | 1 |
| ## 19 | 0.6 | NaN | 0.0 | NaN | NA | 0 | 1 |
| ## 20 | 0.6 | NaN | 0.2 | NaN | NA | 0 | 1 |
| ## 21 | 0.6 | NaN | 0.4 | NaN | NA | 0 | 1 |
| ## 22 | 0.6 | NaN | 0.6 | NaN | NA | 0 | 1 |
| ## 23 | 0.6 | NaN | 0.8 | NaN | NA | 0 | 1 |
| ## 24 | 0.6 | NaN | 1.0 | NaN | NA | 0 | 1 |
| ## 25 | 0.8 | NaN | 0.0 | NaN | NA | 0 | 1 |
| ## 26 | 0.8 | NaN | 0.2 | NaN | NA | 0 | 1 |
| ## 27 | 0.8 | NaN | 0.4 | NaN | NA | 0 | 1 |
| ## 28 | 0.8 | NaN | 0.6 | NaN | NA | 0 | 1 |
| ## 29 | 0.8 | NaN | 0.8 | NaN | NA | 0 | 1 |
| ## 30 | 0.8 | NaN | 1.0 | NaN | NA | 0 | 1 |
| ## 31 | 1.0 | NaN | 0.0 | NaN | NA | 0 | 1 |
| ## 32 | 1.0 | NaN | 0.2 | NaN | NA | 0 | 1 |
| ## 33 | 1.0 | NaN | 0.4 | NaN | NA | 0 | 1 |
| ## 34 | 1.0 | NaN | 0.6 | NaN | NA | 0 | 1 |
| ## 35 | 1.0 | NaN | 0.8 | NaN | NA | 0 | 1 |
| ## 36 | 1.0 | NaN | 1.0 | NaN | NA | 0 | 1 |
| ## 37 | 0.0 | NaN | 0.0 | NaN | NA | 0 | 2 |
| ## 38 | 0.0 | NaN | 0.2 | NaN | NA | 0 | 2 |
| ## 39 | 0.0 | NaN | 0.4 | NaN | NA | 0 | 2 |
| ## 40 | 0.0 | NaN | 0.6 | NaN | NA | 0 | 2 |
| ## 41 | 0.0 | NaN | 0.8 | NaN | NA | 0 | 2 |
| ## 42 | 0.0 | NaN | 1.0 | NaN | NA | 0 | 2 |

| | | | | | | | |
|-------|-----|-----|-----|-----|----|---|---|
| ## 43 | 0.2 | NaN | 0.0 | NaN | NA | 0 | 2 |
| ## 44 | 0.2 | NaN | 0.2 | NaN | NA | 0 | 2 |
| ## 45 | 0.2 | NaN | 0.4 | NaN | NA | 0 | 2 |
| ## 46 | 0.2 | NaN | 0.6 | NaN | NA | 0 | 2 |
| ## 47 | 0.2 | NaN | 0.8 | NaN | NA | 0 | 2 |
| ## 48 | 0.2 | NaN | 1.0 | NaN | NA | 0 | 2 |
| ## 49 | 0.4 | NaN | 0.0 | NaN | NA | 0 | 2 |
| ## 50 | 0.4 | NaN | 0.2 | NaN | NA | 0 | 2 |
| ## 51 | 0.4 | NaN | 0.4 | NaN | NA | 0 | 2 |
| ## 52 | 0.4 | NaN | 0.6 | NaN | NA | 0 | 2 |
| ## 53 | 0.4 | NaN | 0.8 | NaN | NA | 0 | 2 |
| ## 54 | 0.4 | NaN | 1.0 | NaN | NA | 0 | 2 |
| ## 55 | 0.6 | NaN | 0.0 | NaN | NA | 0 | 2 |
| ## 56 | 0.6 | NaN | 0.2 | NaN | NA | 0 | 2 |
| ## 57 | 0.6 | NaN | 0.4 | NaN | NA | 0 | 2 |
| ## 58 | 0.6 | NaN | 0.6 | NaN | NA | 0 | 2 |
| ## 59 | 0.6 | NaN | 0.8 | NaN | NA | 0 | 2 |
| ## 60 | 0.6 | NaN | 1.0 | NaN | NA | 0 | 2 |
| ## 61 | 0.8 | NaN | 0.0 | NaN | NA | 0 | 2 |
| ## 62 | 0.8 | NaN | 0.2 | NaN | NA | 0 | 2 |
| ## 63 | 0.8 | NaN | 0.4 | NaN | NA | 0 | 2 |
| ## 64 | 0.8 | NaN | 0.6 | NaN | NA | 0 | 2 |
| ## 65 | 0.8 | NaN | 0.8 | NaN | NA | 0 | 2 |
| ## 66 | 0.8 | NaN | 1.0 | NaN | NA | 0 | 2 |
| ## 67 | 1.0 | NaN | 0.0 | NaN | NA | 0 | 2 |
| ## 68 | 1.0 | NaN | 0.2 | NaN | NA | 0 | 2 |
| ## 69 | 1.0 | NaN | 0.4 | NaN | NA | 0 | 2 |
| ## 70 | 1.0 | NaN | 0.6 | NaN | NA | 0 | 2 |
| ## 71 | 1.0 | NaN | 0.8 | NaN | NA | 0 | 2 |
| ## 72 | 1.0 | NaN | 1.0 | NaN | NA | 0 | 2 |
| ## 73 | 0.0 | NaN | 0.0 | NaN | NA | 0 | 3 |
| ## 74 | 0.0 | NaN | 0.2 | NaN | NA | 0 | 3 |
| ## 75 | 0.0 | NaN | 0.4 | NaN | NA | 0 | 3 |
| ## 76 | 0.0 | NaN | 0.6 | NaN | NA | 0 | 3 |
| ## 77 | 0.0 | NaN | 0.8 | NaN | NA | 0 | 3 |
| ## 78 | 0.0 | NaN | 1.0 | NaN | NA | 0 | 3 |
| ## 79 | 0.2 | NaN | 0.0 | NaN | NA | 0 | 3 |
| ## 80 | 0.2 | NaN | 0.2 | NaN | NA | 0 | 3 |
| ## 81 | 0.2 | NaN | 0.4 | NaN | NA | 0 | 3 |
| ## 82 | 0.2 | NaN | 0.6 | NaN | NA | 0 | 3 |
| ## 83 | 0.2 | NaN | 0.8 | NaN | NA | 0 | 3 |
| ## 84 | 0.2 | NaN | 1.0 | NaN | NA | 0 | 3 |
| ## 85 | 0.4 | NaN | 0.0 | NaN | NA | 0 | 3 |
| ## 86 | 0.4 | NaN | 0.2 | NaN | NA | 0 | 3 |
| ## 87 | 0.4 | NaN | 0.4 | NaN | NA | 0 | 3 |
| ## 88 | 0.4 | NaN | 0.6 | NaN | NA | 0 | 3 |
| ## 89 | 0.4 | NaN | 0.8 | NaN | NA | 0 | 3 |
| ## 90 | 0.4 | NaN | 1.0 | NaN | NA | 0 | 3 |
| ## 91 | 0.6 | NaN | 0.0 | NaN | NA | 0 | 3 |
| ## 92 | 0.6 | NaN | 0.2 | NaN | NA | 0 | 3 |
| ## 93 | 0.6 | NaN | 0.4 | NaN | NA | 0 | 3 |
| ## 94 | 0.6 | NaN | 0.6 | NaN | NA | 0 | 3 |
| ## 95 | 0.6 | NaN | 0.8 | NaN | NA | 0 | 3 |
| ## 96 | 0.6 | NaN | 1.0 | NaN | NA | 0 | 3 |

| | | | | | | | |
|--------|-----|-----|-----|-----|----|---|---|
| ## 97 | 0.8 | NaN | 0.0 | NaN | NA | 0 | 3 |
| ## 98 | 0.8 | NaN | 0.2 | NaN | NA | 0 | 3 |
| ## 99 | 0.8 | NaN | 0.4 | NaN | NA | 0 | 3 |
| ## 100 | 0.8 | NaN | 0.6 | NaN | NA | 0 | 3 |
| ## 101 | 0.8 | NaN | 0.8 | NaN | NA | 0 | 3 |
| ## 102 | 0.8 | NaN | 1.0 | NaN | NA | 0 | 3 |
| ## 103 | 1.0 | NaN | 0.0 | NaN | NA | 0 | 3 |
| ## 104 | 1.0 | NaN | 0.2 | NaN | NA | 0 | 3 |
| ## 105 | 1.0 | NaN | 0.4 | NaN | NA | 0 | 3 |
| ## 106 | 1.0 | NaN | 0.6 | NaN | NA | 0 | 3 |
| ## 107 | 1.0 | NaN | 0.8 | NaN | NA | 0 | 3 |
| ## 108 | 1.0 | NaN | 1.0 | NaN | NA | 0 | 3 |
| ## 109 | 0.0 | NaN | 0.0 | NaN | NA | 0 | 4 |
| ## 110 | 0.0 | NaN | 0.2 | NaN | NA | 0 | 4 |
| ## 111 | 0.0 | NaN | 0.4 | NaN | NA | 0 | 4 |
| ## 112 | 0.0 | NaN | 0.6 | NaN | NA | 0 | 4 |
| ## 113 | 0.0 | NaN | 0.8 | NaN | NA | 0 | 4 |
| ## 114 | 0.0 | NaN | 1.0 | NaN | NA | 0 | 4 |
| ## 115 | 0.2 | NaN | 0.0 | NaN | NA | 0 | 4 |
| ## 116 | 0.2 | NaN | 0.2 | NaN | NA | 0 | 4 |
| ## 117 | 0.2 | NaN | 0.4 | NaN | NA | 0 | 4 |
| ## 118 | 0.2 | NaN | 0.6 | NaN | NA | 0 | 4 |
| ## 119 | 0.2 | NaN | 0.8 | NaN | NA | 0 | 4 |
| ## 120 | 0.2 | NaN | 1.0 | NaN | NA | 0 | 4 |
| ## 121 | 0.4 | NaN | 0.0 | NaN | NA | 0 | 4 |
| ## 122 | 0.4 | NaN | 0.2 | NaN | NA | 0 | 4 |
| ## 123 | 0.4 | NaN | 0.4 | NaN | NA | 0 | 4 |
| ## 124 | 0.4 | NaN | 0.6 | NaN | NA | 0 | 4 |
| ## 125 | 0.4 | NaN | 0.8 | NaN | NA | 0 | 4 |
| ## 126 | 0.4 | NaN | 1.0 | NaN | NA | 0 | 4 |
| ## 127 | 0.6 | NaN | 0.0 | NaN | NA | 0 | 4 |
| ## 128 | 0.6 | NaN | 0.2 | NaN | NA | 0 | 4 |
| ## 129 | 0.6 | NaN | 0.4 | NaN | NA | 0 | 4 |
| ## 130 | 0.6 | NaN | 0.6 | NaN | NA | 0 | 4 |
| ## 131 | 0.6 | NaN | 0.8 | NaN | NA | 0 | 4 |
| ## 132 | 0.6 | NaN | 1.0 | NaN | NA | 0 | 4 |
| ## 133 | 0.8 | NaN | 0.0 | NaN | NA | 0 | 4 |
| ## 134 | 0.8 | NaN | 0.2 | NaN | NA | 0 | 4 |
| ## 135 | 0.8 | NaN | 0.4 | NaN | NA | 0 | 4 |
| ## 136 | 0.8 | NaN | 0.6 | NaN | NA | 0 | 4 |
| ## 137 | 0.8 | NaN | 0.8 | NaN | NA | 0 | 4 |
| ## 138 | 0.8 | NaN | 1.0 | NaN | NA | 0 | 4 |
| ## 139 | 1.0 | NaN | 0.0 | NaN | NA | 0 | 4 |
| ## 140 | 1.0 | NaN | 0.2 | NaN | NA | 0 | 4 |
| ## 141 | 1.0 | NaN | 0.4 | NaN | NA | 0 | 4 |
| ## 142 | 1.0 | NaN | 0.6 | NaN | NA | 0 | 4 |
| ## 143 | 1.0 | NaN | 0.8 | NaN | NA | 0 | 4 |
| ## 144 | 1.0 | NaN | 1.0 | NaN | NA | 0 | 4 |
| ## 145 | 0.0 | NaN | 0.0 | NaN | NA | 0 | 5 |
| ## 146 | 0.0 | NaN | 0.2 | NaN | NA | 0 | 5 |
| ## 147 | 0.0 | NaN | 0.4 | NaN | NA | 0 | 5 |
| ## 148 | 0.0 | NaN | 0.6 | NaN | NA | 0 | 5 |
| ## 149 | 0.0 | NaN | 0.8 | NaN | NA | 0 | 5 |
| ## 150 | 0.0 | NaN | 1.0 | NaN | NA | 0 | 5 |

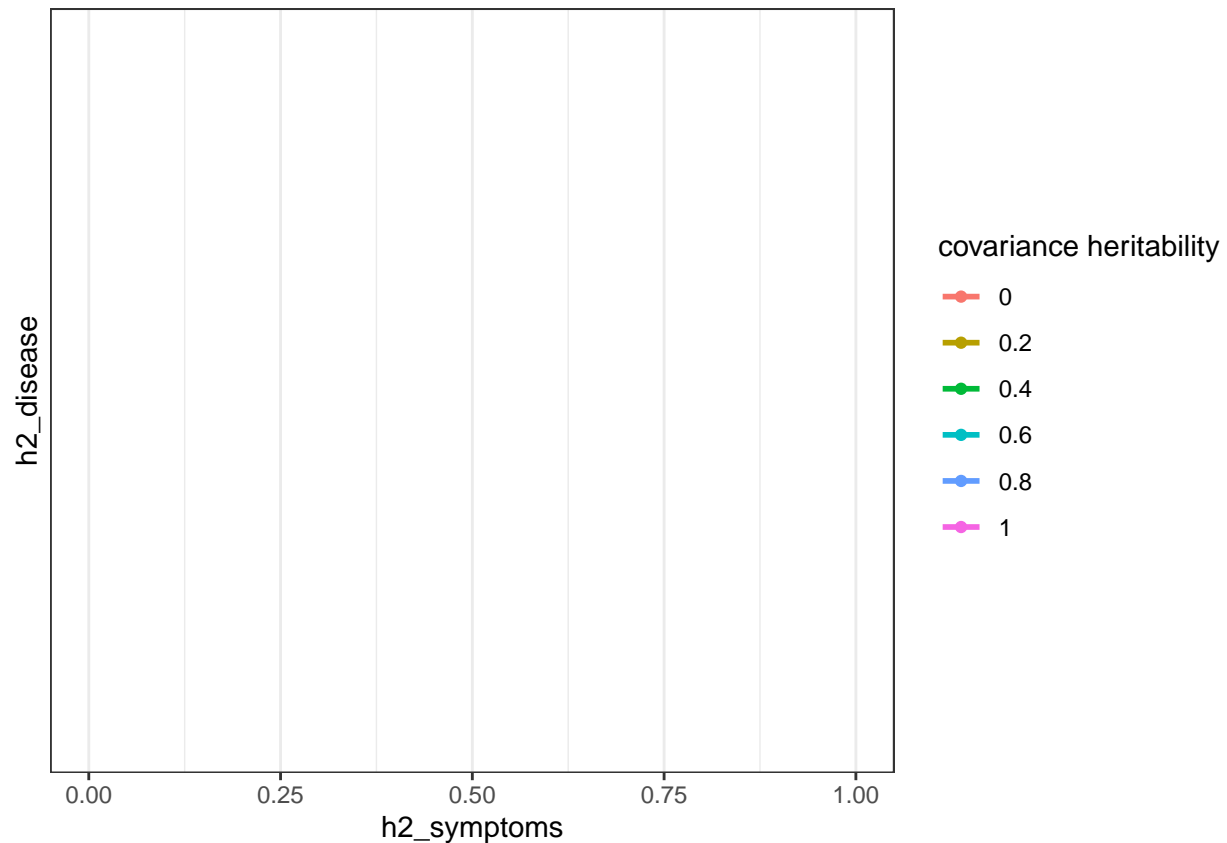
| | | | | | | | |
|--------|-----|-----|-----|-----|----|---|---|
| ## 151 | 0.2 | NaN | 0.0 | NaN | NA | 0 | 5 |
| ## 152 | 0.2 | NaN | 0.2 | NaN | NA | 0 | 5 |
| ## 153 | 0.2 | NaN | 0.4 | NaN | NA | 0 | 5 |
| ## 154 | 0.2 | NaN | 0.6 | NaN | NA | 0 | 5 |
| ## 155 | 0.2 | NaN | 0.8 | NaN | NA | 0 | 5 |
| ## 156 | 0.2 | NaN | 1.0 | NaN | NA | 0 | 5 |
| ## 157 | 0.4 | NaN | 0.0 | NaN | NA | 0 | 5 |
| ## 158 | 0.4 | NaN | 0.2 | NaN | NA | 0 | 5 |
| ## 159 | 0.4 | NaN | 0.4 | NaN | NA | 0 | 5 |
| ## 160 | 0.4 | NaN | 0.6 | NaN | NA | 0 | 5 |
| ## 161 | 0.4 | NaN | 0.8 | NaN | NA | 0 | 5 |
| ## 162 | 0.4 | NaN | 1.0 | NaN | NA | 0 | 5 |
| ## 163 | 0.6 | NaN | 0.0 | NaN | NA | 0 | 5 |
| ## 164 | 0.6 | NaN | 0.2 | NaN | NA | 0 | 5 |
| ## 165 | 0.6 | NaN | 0.4 | NaN | NA | 0 | 5 |
| ## 166 | 0.6 | NaN | 0.6 | NaN | NA | 0 | 5 |
| ## 167 | 0.6 | NaN | 0.8 | NaN | NA | 0 | 5 |
| ## 168 | 0.6 | NaN | 1.0 | NaN | NA | 0 | 5 |
| ## 169 | 0.8 | NaN | 0.0 | NaN | NA | 0 | 5 |
| ## 170 | 0.8 | NaN | 0.2 | NaN | NA | 0 | 5 |
| ## 171 | 0.8 | NaN | 0.4 | NaN | NA | 0 | 5 |
| ## 172 | 0.8 | NaN | 0.6 | NaN | NA | 0 | 5 |
| ## 173 | 0.8 | NaN | 0.8 | NaN | NA | 0 | 5 |
| ## 174 | 0.8 | NaN | 1.0 | NaN | NA | 0 | 5 |
| ## 175 | 1.0 | NaN | 0.0 | NaN | NA | 0 | 5 |
| ## 176 | 1.0 | NaN | 0.2 | NaN | NA | 0 | 5 |
| ## 177 | 1.0 | NaN | 0.4 | NaN | NA | 0 | 5 |
| ## 178 | 1.0 | NaN | 0.6 | NaN | NA | 0 | 5 |
| ## 179 | 1.0 | NaN | 0.8 | NaN | NA | 0 | 5 |
| ## 180 | 1.0 | NaN | 1.0 | NaN | NA | 0 | 5 |

```
ggplot(rows_3,aes(x=h2_symptoms,y=h2_disease,col=factor(h2_covariance))) +
  geom_point() +
  geom_smooth(se=F) +
  labs(col="covariance heritability")
```

```
## 'geom_smooth()' using method = 'loess' and formula = 'y ~ x'
```

```
## Warning: Removed 180 rows containing non-finite values ('stat_smooth()').
```

```
## Warning: Removed 180 rows containing missing values ('geom_point()').
```



Symptoms are not heritable and there is covariance

```
rows_n <- data.frame()
reps <- 10
p <- 5
rho <- 0.5
her <- 0

for (r in c(1:reps)){
  print(r)
  for (rho in seq(0,1,0.2)){
    for (n in c(1:(p-1))){
      print(paste("Running for rep",r, "heritability", her, "threshold number", n, "rho", rho))
      G <- simulate_genotypes(N = N,L = 1)
      G <- scale(G)

      Sigma <- matrix(rho,nrow=p,ncol=p)
      diag(Sigma) <- 1

      beta <- matrix(mvrnorm(n=1,mu = rep(0,p),Sigma = Sigma),nrow=1) %*% diag(1,p,p) * sqrt(her / 1)
      e <- matrix(mvrnorm(n=N,mu = rep(0,p),Sigma = Sigma),nrow=N) * sqrt(1-her)

      X <- G %*% beta + e
    }
  }
}
```

```

c <- 2
Y <- apply(X,1,mdd_risk,threshold=c,n=n)
prev <- sum(Y)/N

while (prev<0.25){
  c <- c - 0.1
  Y <- apply(X,1,mdd_risk,threshold=c,n=n)
  prev <- sum(Y)/N
}

print(paste("Set threshold",c,"and prevalence",prev))
res <- greml(Y,G)
h2 <- res$h2

rows_n <- rbind(rows_n,data.frame("h2_symptoms"=her,
                                   "h2_disease"=h2,
                                   "sig2g"=res$sig2g,
                                   "sig2e"=res$sig2e,
                                   "prev"=sum(Y),
                                   "rep"=r,
                                   "p"=p,
                                   "c"=c,
                                   "n"=n,
                                   "rho"=rho))
}
}
}

```

```

## [1] 1
## [1] "Running for rep 1 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.261"
## [1] "Running for rep 1 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.289"
## [1] "Running for rep 1 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.20000000000000001 and prevalence 0.314"
## [1] "Running for rep 1 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.70000000000000001 and prevalence 0.258"
## [1] "Running for rep 1 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.285"
## [1] "Running for rep 1 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.265"
## [1] "Running for rep 1 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.252"
## [1] "Running for rep 1 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.60000000000000001 and prevalence 0.282"
## [1] "Running for rep 1 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.262"
## [1] "Running for rep 1 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.251"
## [1] "Running for rep 1 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.09999999999999994 and prevalence 0.267"
## [1] "Running for rep 1 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.40000000000000001 and prevalence 0.253"

```



```

## [1] "Running for rep 1 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.253"
## [1] "Running for rep 1 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.26"
## [1] "Running for rep 1 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.1999999999999999 and prevalence 0.288"
## [1] "Running for rep 1 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.26"
## [1] "Running for rep 1 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.26"
## [1] "Running for rep 1 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.271"
## [1] "Running for rep 1 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.29"
## [1] "Running for rep 1 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.283"
## [1] "Running for rep 1 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.267"
## [1] "Running for rep 1 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.273"
## [1] "Running for rep 1 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.27"
## [1] "Running for rep 1 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.267"
## [1] 2
## [1] "Running for rep 2 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.304"
## [1] "Running for rep 2 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.304"
## [1] "Running for rep 2 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.1000000000000001 and prevalence 0.27"
## [1] "Running for rep 2 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.8000000000000001 and prevalence 0.303"
## [1] "Running for rep 2 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.267"
## [1] "Running for rep 2 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.27"
## [1] "Running for rep 2 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.262"
## [1] "Running for rep 2 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.6000000000000001 and prevalence 0.266"
## [1] "Running for rep 2 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.272"
## [1] "Running for rep 2 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.277"
## [1] "Running for rep 2 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.255"
## [1] "Running for rep 2 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.4000000000000001 and prevalence 0.272"
## [1] "Running for rep 2 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.258"
## [1] "Running for rep 2 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.255"
## [1] "Running for rep 2 heritability 0 threshold number 3 rho 0.6"

```

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## [1] "Set threshold 0.2999999999999999 and prevalence 0.251"
## [1] "Running for rep 2 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.256"
## [1] "Running for rep 2 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.275"
## [1] "Running for rep 2 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.276"
## [1] "Running for rep 2 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.274"
## [1] "Running for rep 2 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.286"
## [1] "Running for rep 2 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.276"
## [1] "Running for rep 2 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.267"
## [1] "Running for rep 2 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.256"
## [1] "Running for rep 2 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.277"
## [1] 3
## [1] "Running for rep 3 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.275"
## [1] "Running for rep 3 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.298"
## [1] "Running for rep 3 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.298"
## [1] "Running for rep 3 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.8000000000000001 and prevalence 0.301"
## [1] "Running for rep 3 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.256"
## [1] "Running for rep 3 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.283"
## [1] "Running for rep 3 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.257"
## [1] "Running for rep 3 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.6000000000000001 and prevalence 0.282"
## [1] "Running for rep 3 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.258"
## [1] "Running for rep 3 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.258"
## [1] "Running for rep 3 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.286"
## [1] "Running for rep 3 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.4000000000000001 and prevalence 0.264"
## [1] "Running for rep 3 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.279"
## [1] "Running for rep 3 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.268"
## [1] "Running for rep 3 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.1999999999999999 and prevalence 0.265"
## [1] "Running for rep 3 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.282"
## [1] "Running for rep 3 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.251"

```

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## [1] "Running for rep 3 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.26"
## [1] "Running for rep 3 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.27"
## [1] "Running for rep 3 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold 0.09999999999999994 and prevalence 0.261"
## [1] "Running for rep 3 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.253"
## [1] "Running for rep 3 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.26"
## [1] "Running for rep 3 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.256"
## [1] "Running for rep 3 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.264"
## [1] 4
## [1] "Running for rep 4 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.296"
## [1] "Running for rep 4 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.302"
## [1] "Running for rep 4 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.20000000000000001 and prevalence 0.312"
## [1] "Running for rep 4 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.70000000000000001 and prevalence 0.262"
## [1] "Running for rep 4 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.282"
## [1] "Running for rep 4 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.268"
## [1] "Running for rep 4 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -0.10000000000000001 and prevalence 0.281"
## [1] "Running for rep 4 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.60000000000000001 and prevalence 0.27"
## [1] "Running for rep 4 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.25"
## [1] "Running for rep 4 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.252"
## [1] "Running for rep 4 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.09999999999999994 and prevalence 0.267"
## [1] "Running for rep 4 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.30000000000000001 and prevalence 0.251"
## [1] "Running for rep 4 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.258"
## [1] "Running for rep 4 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.282"
## [1] "Running for rep 4 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.1999999999999999 and prevalence 0.267"
## [1] "Running for rep 4 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.20000000000000001 and prevalence 0.27"
## [1] "Running for rep 4 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.259"
## [1] "Running for rep 4 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.262"
## [1] "Running for rep 4 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.273"
## [1] "Running for rep 4 heritability 0 threshold number 4 rho 0.8"

```

```

## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.267"
## [1] "Running for rep 4 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.278"
## [1] "Running for rep 4 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.255"
## [1] "Running for rep 4 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.281"
## [1] "Running for rep 4 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.267"
## [1] 5
## [1] "Running for rep 5 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.799999999999999 and prevalence 0.294"
## [1] "Running for rep 5 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.299999999999999 and prevalence 0.278"
## [1] "Running for rep 5 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.200000000000001 and prevalence 0.295"
## [1] "Running for rep 5 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.700000000000001 and prevalence 0.252"
## [1] "Running for rep 5 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.899999999999999 and prevalence 0.257"
## [1] "Running for rep 5 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.399999999999999 and prevalence 0.282"
## [1] "Running for rep 5 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.262"
## [1] "Running for rep 5 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.600000000000001 and prevalence 0.283"
## [1] "Running for rep 5 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.899999999999999 and prevalence 0.263"
## [1] "Running for rep 5 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.499999999999999 and prevalence 0.25"
## [1] "Running for rep 5 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.255"
## [1] "Running for rep 5 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.400000000000001 and prevalence 0.269"
## [1] "Running for rep 5 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.799999999999999 and prevalence 0.269"
## [1] "Running for rep 5 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.499999999999999 and prevalence 0.25"
## [1] "Running for rep 5 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.199999999999999 and prevalence 0.274"
## [1] "Running for rep 5 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.200000000000001 and prevalence 0.267"
## [1] "Running for rep 5 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.799999999999999 and prevalence 0.273"
## [1] "Running for rep 5 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.599999999999999 and prevalence 0.272"
## [1] "Running for rep 5 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.299999999999999 and prevalence 0.26"
## [1] "Running for rep 5 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.268"
## [1] "Running for rep 5 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.279"
## [1] "Running for rep 5 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.699999999999999 and prevalence 0.251"

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## [1] "Running for rep 5 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.256"
## [1] "Running for rep 5 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.251"
## [1] 6
## [1] "Running for rep 6 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.278"
## [1] "Running for rep 6 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.282"
## [1] "Running for rep 6 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.27"
## [1] "Running for rep 6 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.8000000000000001 and prevalence 0.295"
## [1] "Running for rep 6 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.257"
## [1] "Running for rep 6 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.309"
## [1] "Running for rep 6 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.28"
## [1] "Running for rep 6 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.5000000000000001 and prevalence 0.25"
## [1] "Running for rep 6 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.265"
## [1] "Running for rep 6 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.258"
## [1] "Running for rep 6 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.286"
## [1] "Running for rep 6 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.5000000000000001 and prevalence 0.284"
## [1] "Running for rep 6 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.269"
## [1] "Running for rep 6 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.265"
## [1] "Running for rep 6 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.1999999999999999 and prevalence 0.275"
## [1] "Running for rep 6 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.281"
## [1] "Running for rep 6 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.282"
## [1] "Running for rep 6 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.251"
## [1] "Running for rep 6 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.283"
## [1] "Running for rep 6 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold 0.1999999999999999 and prevalence 0.255"
## [1] "Running for rep 6 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.284"
## [1] "Running for rep 6 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.264"
## [1] "Running for rep 6 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.267"
## [1] "Running for rep 6 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.257"
## [1] 7

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## [1] "Running for rep 7 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.301"
## [1] "Running for rep 7 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.281"
## [1] "Running for rep 7 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.299"
## [1] "Running for rep 7 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.8000000000000001 and prevalence 0.29"
## [1] "Running for rep 7 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.276"
## [1] "Running for rep 7 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.279"
## [1] "Running for rep 7 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.263"
## [1] "Running for rep 7 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.6000000000000001 and prevalence 0.278"
## [1] "Running for rep 7 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.257"
## [1] "Running for rep 7 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.289"
## [1] "Running for rep 7 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.27"
## [1] "Running for rep 7 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.4000000000000001 and prevalence 0.268"
## [1] "Running for rep 7 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.267"
## [1] "Running for rep 7 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.253"
## [1] "Running for rep 7 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.1999999999999999 and prevalence 0.273"
## [1] "Running for rep 7 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.268"
## [1] "Running for rep 7 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.266"
## [1] "Running for rep 7 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.285"
## [1] "Running for rep 7 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.272"
## [1] "Running for rep 7 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.252"
## [1] "Running for rep 7 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.263"
## [1] "Running for rep 7 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.257"
## [1] "Running for rep 7 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.271"
## [1] "Running for rep 7 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.258"
## [1] 8
## [1] "Running for rep 8 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.279"
## [1] "Running for rep 8 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.274"
## [1] "Running for rep 8 heritability 0 threshold number 3 rho 0"

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## [1] "Set threshold -0.2000000000000001 and prevalence 0.307"
## [1] "Running for rep 8 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.8000000000000001 and prevalence 0.296"
## [1] "Running for rep 8 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.799999999999999 and prevalence 0.305"
## [1] "Running for rep 8 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.399999999999999 and prevalence 0.251"
## [1] "Running for rep 8 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.283"
## [1] "Running for rep 8 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.6000000000000001 and prevalence 0.295"
## [1] "Running for rep 8 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.799999999999999 and prevalence 0.273"
## [1] "Running for rep 8 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.499999999999999 and prevalence 0.255"
## [1] "Running for rep 8 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.263"
## [1] "Running for rep 8 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.4000000000000001 and prevalence 0.272"
## [1] "Running for rep 8 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.799999999999999 and prevalence 0.279"
## [1] "Running for rep 8 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.499999999999999 and prevalence 0.253"
## [1] "Running for rep 8 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.199999999999999 and prevalence 0.257"
## [1] "Running for rep 8 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.27"
## [1] "Running for rep 8 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.799999999999999 and prevalence 0.27"
## [1] "Running for rep 8 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.499999999999999 and prevalence 0.268"
## [1] "Running for rep 8 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.399999999999999 and prevalence 0.253"
## [1] "Running for rep 8 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.263"
## [1] "Running for rep 8 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.264"
## [1] "Running for rep 8 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.699999999999999 and prevalence 0.252"
## [1] "Running for rep 8 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.261"
## [1] "Running for rep 8 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.699999999999999 and prevalence 0.254"
## [1] 9
## [1] "Running for rep 9 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.799999999999999 and prevalence 0.282"
## [1] "Running for rep 9 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.399999999999999 and prevalence 0.258"
## [1] "Running for rep 9 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.301"
## [1] "Running for rep 9 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.8000000000000001 and prevalence 0.283"
## [1] "Running for rep 9 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.799999999999999 and prevalence 0.292"

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## [1] "Running for rep 9 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.263"
## [1] "Running for rep 9 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.266"
## [1] "Running for rep 9 heritability 0 threshold number 4 rho 0.2"
## [1] "Set threshold -0.6000000000000001 and prevalence 0.269"
## [1] "Running for rep 9 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.262"
## [1] "Running for rep 9 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.298"
## [1] "Running for rep 9 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.4000000000000001 and prevalence 0.265"
## [1] "Running for rep 9 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.289"
## [1] "Running for rep 9 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.26"
## [1] "Running for rep 9 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.274"
## [1] "Running for rep 9 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.266"
## [1] "Running for rep 9 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.256"
## [1] "Running for rep 9 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.279"
## [1] "Running for rep 9 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold 0.0999999999999994 and prevalence 0.27"
## [1] "Running for rep 9 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.263"
## [1] "Running for rep 9 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.273"
## [1] "Running for rep 9 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.5999999999999999 and prevalence 0.283"
## [1] "Running for rep 9 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.6999999999999999 and prevalence 0.251"
## [1] 10
## [1] "Running for rep 10 heritability 0 threshold number 1 rho 0"
## [1] "Set threshold 0.7999999999999999 and prevalence 0.276"
## [1] "Running for rep 10 heritability 0 threshold number 2 rho 0"
## [1] "Set threshold 0.2999999999999999 and prevalence 0.279"
## [1] "Running for rep 10 heritability 0 threshold number 3 rho 0"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.277"
## [1] "Running for rep 10 heritability 0 threshold number 4 rho 0"
## [1] "Set threshold -0.7000000000000001 and prevalence 0.269"
## [1] "Running for rep 10 heritability 0 threshold number 1 rho 0.2"
## [1] "Set threshold 0.8999999999999999 and prevalence 0.25"
## [1] "Running for rep 10 heritability 0 threshold number 2 rho 0.2"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.28"
## [1] "Running for rep 10 heritability 0 threshold number 3 rho 0.2"
## [1] "Set threshold -6.38378239159465e-16 and prevalence 0.254"
## [1] "Running for rep 10 heritability 0 threshold number 4 rho 0.2"

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## [1] "Set threshold -0.500000000000001 and prevalence 0.253"
## [1] "Running for rep 10 heritability 0 threshold number 1 rho 0.4"
## [1] "Set threshold 0.899999999999999 and prevalence 0.266"
## [1] "Running for rep 10 heritability 0 threshold number 2 rho 0.4"
## [1] "Set threshold 0.399999999999999 and prevalence 0.295"
## [1] "Running for rep 10 heritability 0 threshold number 3 rho 0.4"
## [1] "Set threshold 0.099999999999994 and prevalence 0.258"
## [1] "Running for rep 10 heritability 0 threshold number 4 rho 0.4"
## [1] "Set threshold -0.400000000000001 and prevalence 0.274"
## [1] "Running for rep 10 heritability 0 threshold number 1 rho 0.6"
## [1] "Set threshold 0.799999999999999 and prevalence 0.289"
## [1] "Running for rep 10 heritability 0 threshold number 2 rho 0.6"
## [1] "Set threshold 0.499999999999999 and prevalence 0.276"
## [1] "Running for rep 10 heritability 0 threshold number 3 rho 0.6"
## [1] "Set threshold 0.199999999999999 and prevalence 0.253"
## [1] "Running for rep 10 heritability 0 threshold number 4 rho 0.6"
## [1] "Set threshold -0.200000000000001 and prevalence 0.267"
## [1] "Running for rep 10 heritability 0 threshold number 1 rho 0.8"
## [1] "Set threshold 0.799999999999999 and prevalence 0.274"
## [1] "Running for rep 10 heritability 0 threshold number 2 rho 0.8"
## [1] "Set threshold 0.599999999999999 and prevalence 0.271"
## [1] "Running for rep 10 heritability 0 threshold number 3 rho 0.8"
## [1] "Set threshold 0.399999999999999 and prevalence 0.267"
## [1] "Running for rep 10 heritability 0 threshold number 4 rho 0.8"
## [1] "Set threshold 0.099999999999994 and prevalence 0.261"
## [1] "Running for rep 10 heritability 0 threshold number 1 rho 1"
## [1] "Set threshold 0.699999999999999 and prevalence 0.257"
## [1] "Running for rep 10 heritability 0 threshold number 2 rho 1"
## [1] "Set threshold 0.699999999999999 and prevalence 0.268"
## [1] "Running for rep 10 heritability 0 threshold number 3 rho 1"
## [1] "Set threshold 0.699999999999999 and prevalence 0.26"
## [1] "Running for rep 10 heritability 0 threshold number 4 rho 1"
## [1] "Set threshold 0.599999999999999 and prevalence 0.269"

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rows_n

| ## | h2_symptoms | h2_disease | sig2g | sig2e | prev | rep | P | c |
|-------|-------------|---------------|---------------|-----------|------|-----|---|---------------|
| ## 1 | 0 | -0.0332409184 | -0.0294929910 | 0.9167426 | 261 | 1 | 5 | 8.000000e-01 |
| ## 2 | 0 | -0.1187082878 | -0.1349621334 | 1.2718847 | 289 | 1 | 5 | 3.000000e-01 |
| ## 3 | 0 | -0.0468261000 | -0.0431135781 | 0.9638304 | 314 | 1 | 5 | -2.000000e-01 |
| ## 4 | 0 | -0.1294268692 | -0.1219778592 | 1.0644240 | 258 | 1 | 5 | -7.000000e-01 |
| ## 5 | 0 | -0.0292715908 | -0.0338951816 | 1.1918501 | 285 | 1 | 5 | 8.000000e-01 |
| ## 6 | 0 | -0.2584434196 | -0.2965781772 | 1.4441337 | 265 | 1 | 5 | 4.000000e-01 |
| ## 7 | 0 | -0.0850718123 | -0.0768349008 | 0.9800119 | 252 | 1 | 5 | -6.383782e-16 |
| ## 8 | 0 | -0.0724529278 | -0.0765944647 | 1.1337562 | 282 | 1 | 5 | -6.000000e-01 |
| ## 9 | 0 | 0.1977456891 | 0.1946323331 | 0.7896234 | 262 | 1 | 5 | 9.000000e-01 |
| ## 10 | 0 | -0.5095804896 | -0.5257590047 | 1.5575077 | 251 | 1 | 5 | 5.000000e-01 |
| ## 11 | 0 | 0.1251094690 | 0.1188876687 | 0.8313815 | 267 | 1 | 5 | 1.000000e-01 |
| ## 12 | 0 | 0.0131300886 | 0.0127540678 | 0.9586078 | 253 | 1 | 5 | -4.000000e-01 |
| ## 13 | 0 | 0.0696549238 | 0.0683917051 | 0.9134729 | 253 | 1 | 5 | 9.000000e-01 |
| ## 14 | 0 | -0.1606628197 | -0.1333684059 | 0.9634821 | 260 | 1 | 5 | 5.000000e-01 |
| ## 15 | 0 | 0.0367848060 | 0.0474761556 | 1.2431697 | 288 | 1 | 5 | 2.000000e-01 |
| ## 16 | 0 | 0.1751256796 | 0.1672473714 | 0.7877660 | 260 | 1 | 5 | -2.000000e-01 |
| ## 17 | 0 | 0.5443172438 | 0.5157699483 | 0.4317840 | 260 | 1 | 5 | 8.000000e-01 |

| | | | | | | | | |
|-------|---|---------------|---------------|-----------|-----|---|---|---------------|
| ## 18 | 0 | -0.2621074181 | -0.2576483582 | 1.2406360 | 271 | 1 | 5 | 5.000000e-01 |
| ## 19 | 0 | -0.2008966661 | -0.2130224946 | 1.2733810 | 290 | 1 | 5 | 3.000000e-01 |
| ## 20 | 0 | -0.0989111360 | -0.0984005897 | 1.0932389 | 283 | 1 | 5 | -6.383782e-16 |
| ## 21 | 0 | -0.1589944640 | -0.1787299618 | 1.3028569 | 267 | 1 | 5 | 7.000000e-01 |
| ## 22 | 0 | -0.0117677946 | -0.0106372061 | 0.9145624 | 273 | 1 | 5 | 7.000000e-01 |
| ## 23 | 0 | -0.0636663687 | -0.0567101646 | 0.9474499 | 270 | 1 | 5 | 6.000000e-01 |
| ## 24 | 0 | -0.1115999028 | -0.1067704426 | 1.0634957 | 267 | 1 | 5 | 6.000000e-01 |
| ## 25 | 0 | 0.2903870000 | 0.2932038084 | 0.7164964 | 304 | 2 | 5 | 8.000000e-01 |
| ## 26 | 0 | 0.1652099945 | 0.1860203159 | 0.9399425 | 304 | 2 | 5 | 3.000000e-01 |
| ## 27 | 0 | -0.1527091027 | -0.1670628118 | 1.2610566 | 270 | 2 | 5 | -1.000000e-01 |
| ## 28 | 0 | -0.0301450475 | -0.0294655278 | 1.0069239 | 303 | 2 | 5 | -8.000000e-01 |
| ## 29 | 0 | -0.3878458676 | -0.3977930036 | 1.4234401 | 267 | 2 | 5 | 9.000000e-01 |
| ## 30 | 0 | -0.3592870320 | -0.3670746655 | 1.3887499 | 270 | 2 | 5 | 4.000000e-01 |
| ## 31 | 0 | 0.0169904319 | 0.0166409667 | 0.9627907 | 262 | 2 | 5 | -6.383782e-16 |
| ## 32 | 0 | -0.2545720458 | -0.2443092244 | 1.2039952 | 266 | 2 | 5 | -6.000000e-01 |
| ## 33 | 0 | 0.2467950279 | 0.2136308712 | 0.6519898 | 272 | 2 | 5 | 8.000000e-01 |
| ## 34 | 0 | 0.0459995466 | 0.0449316814 | 0.9318536 | 277 | 2 | 5 | 4.000000e-01 |
| ## 35 | 0 | 0.0239137385 | 0.0277374077 | 1.1321568 | 255 | 2 | 5 | 1.000000e-01 |
| ## 36 | 0 | -0.0314334912 | -0.0305230245 | 1.0015582 | 272 | 2 | 5 | -4.000000e-01 |
| ## 37 | 0 | 0.2690605197 | 0.2831918235 | 0.7693291 | 258 | 2 | 5 | 9.000000e-01 |
| ## 38 | 0 | -0.0274012762 | -0.0282595359 | 1.0595814 | 255 | 2 | 5 | 6.000000e-01 |
| ## 39 | 0 | 0.2393271883 | 0.2644060145 | 0.8403829 | 251 | 2 | 5 | 3.000000e-01 |
| ## 40 | 0 | 0.2999999352 | 0.2614394332 | 0.6100255 | 256 | 2 | 5 | -2.000000e-01 |
| ## 41 | 0 | 0.1779856388 | 0.1904377393 | 0.8795235 | 275 | 2 | 5 | 8.000000e-01 |
| ## 42 | 0 | -0.1215917509 | -0.1233256001 | 1.1375852 | 276 | 2 | 5 | 5.000000e-01 |
| ## 43 | 0 | -0.0361670058 | -0.0347439964 | 0.9953985 | 274 | 2 | 5 | 3.000000e-01 |
| ## 44 | 0 | 0.1075282014 | 0.1065895231 | 0.8846809 | 286 | 2 | 5 | -6.383782e-16 |
| ## 45 | 0 | 0.1732236393 | 0.1514984198 | 0.7230844 | 276 | 2 | 5 | 6.000000e-01 |
| ## 46 | 0 | -0.0246148034 | -0.0274654667 | 1.1432764 | 267 | 2 | 5 | 7.000000e-01 |
| ## 47 | 0 | -0.2111127028 | -0.2134005980 | 1.2242379 | 256 | 2 | 5 | 7.000000e-01 |
| ## 48 | 0 | 0.2379329150 | 0.2757039248 | 0.8830425 | 277 | 2 | 5 | 6.000000e-01 |
| ## 49 | 0 | -0.3345690126 | -0.2992391305 | 1.1936409 | 275 | 3 | 5 | 8.000000e-01 |
| ## 50 | 0 | -0.0087897198 | -0.0095636096 | 1.0976085 | 298 | 3 | 5 | 3.000000e-01 |
| ## 51 | 0 | -0.0551083624 | -0.0475402071 | 0.9102080 | 298 | 3 | 5 | -2.000000e-01 |
| ## 52 | 0 | 0.2660337934 | 0.2194681321 | 0.6054952 | 301 | 3 | 5 | -8.000000e-01 |
| ## 53 | 0 | 0.0437465778 | 0.0403305727 | 0.8815832 | 256 | 3 | 5 | 9.000000e-01 |
| ## 54 | 0 | -0.1092196352 | -0.1111989006 | 1.1293208 | 283 | 3 | 5 | 4.000000e-01 |
| ## 55 | 0 | -0.0779962781 | -0.0751560409 | 1.0387410 | 257 | 3 | 5 | -6.383782e-16 |
| ## 56 | 0 | 0.2230636488 | 0.2076870580 | 0.7233793 | 282 | 3 | 5 | -6.000000e-01 |
| ## 57 | 0 | 0.5141527318 | 0.4851497716 | 0.4584410 | 258 | 3 | 5 | 9.000000e-01 |
| ## 58 | 0 | 0.1773737785 | 0.2131732205 | 0.9886573 | 258 | 3 | 5 | 5.000000e-01 |
| ## 59 | 0 | 0.2342480886 | 0.1922269762 | 0.6283858 | 286 | 3 | 5 | 1.000000e-01 |
| ## 60 | 0 | -0.2364067188 | -0.2406856271 | 1.2587854 | 264 | 3 | 5 | -4.000000e-01 |
| ## 61 | 0 | -0.2228114077 | -0.2091265188 | 1.1477074 | 279 | 3 | 5 | 8.000000e-01 |
| ## 62 | 0 | -0.4671853134 | -0.4783320340 | 1.5021913 | 268 | 3 | 5 | 5.000000e-01 |
| ## 63 | 0 | 0.2882246284 | 0.2865695015 | 0.7076880 | 265 | 3 | 5 | 2.000000e-01 |
| ## 64 | 0 | -0.2666881227 | -0.2706200754 | 1.2853637 | 282 | 3 | 5 | -2.000000e-01 |
| ## 65 | 0 | -0.0614282402 | -0.0618150584 | 1.0681121 | 251 | 3 | 5 | 8.000000e-01 |
| ## 66 | 0 | 0.1663969373 | 0.1612128726 | 0.8076323 | 260 | 3 | 5 | 6.000000e-01 |
| ## 67 | 0 | 0.0328357082 | 0.0315504670 | 0.9293080 | 270 | 3 | 5 | 3.000000e-01 |
| ## 68 | 0 | -0.1974960192 | -0.2277227134 | 1.3807724 | 261 | 3 | 5 | 1.000000e-01 |
| ## 69 | 0 | -0.0063992289 | -0.0070054509 | 1.1017391 | 253 | 3 | 5 | 7.000000e-01 |
| ## 70 | 0 | -0.2043994621 | -0.1618416219 | 0.9536325 | 260 | 3 | 5 | 6.000000e-01 |
| ## 71 | 0 | -0.5395879149 | -0.6230709406 | 1.7777872 | 256 | 3 | 5 | 7.000000e-01 |

| | | | | | | | |
|--------|---|---------------|---------------|-----------|-----|-----|---------------|
| ## 72 | 0 | 0.1598949541 | 0.1658695313 | 0.8714961 | 264 | 3 5 | 6.000000e-01 |
| ## 73 | 0 | -0.1550971557 | -0.1638397460 | 1.2202082 | 296 | 4 5 | 8.000000e-01 |
| ## 74 | 0 | 0.2447836773 | 0.2394184441 | 0.7386633 | 302 | 4 5 | 3.000000e-01 |
| ## 75 | 0 | -0.1143726833 | -0.1080217082 | 1.0524929 | 312 | 4 5 | -2.000000e-01 |
| ## 76 | 0 | -0.0892926656 | -0.0875632614 | 1.0681954 | 262 | 4 5 | -7.000000e-01 |
| ## 77 | 0 | -0.1752668227 | -0.1841775571 | 1.2350185 | 282 | 4 5 | 8.000000e-01 |
| ## 78 | 0 | -0.0904675473 | -0.0934407922 | 1.1263061 | 268 | 4 5 | 4.000000e-01 |
| ## 79 | 0 | -0.1911658939 | -0.1752113916 | 1.0917525 | 281 | 4 5 | -1.000000e-01 |
| ## 80 | 0 | -0.4692824384 | -0.4791303653 | 1.5001154 | 270 | 4 5 | -6.000000e-01 |
| ## 81 | 0 | -0.2322972098 | -0.2086659388 | 1.1069373 | 250 | 4 5 | 9.000000e-01 |
| ## 82 | 0 | 0.3498727927 | 0.3633787151 | 0.6752237 | 252 | 4 5 | 5.000000e-01 |
| ## 83 | 0 | 0.1270470251 | 0.1210614715 | 0.8318256 | 267 | 4 5 | 1.000000e-01 |
| ## 84 | 0 | -0.1946365140 | -0.2057029950 | 1.2625602 | 251 | 4 5 | -3.000000e-01 |
| ## 85 | 0 | -0.5114118359 | -0.5442297385 | 1.6084009 | 258 | 4 5 | 8.000000e-01 |
| ## 86 | 0 | -0.0113873352 | -0.0113312675 | 1.0064076 | 282 | 4 5 | 5.000000e-01 |
| ## 87 | 0 | -0.4129641416 | -0.3965434293 | 1.3567804 | 267 | 4 5 | 2.000000e-01 |
| ## 88 | 0 | -0.2802222946 | -0.3110836540 | 1.4212154 | 270 | 4 5 | -2.000000e-01 |
| ## 89 | 0 | -0.2468284672 | -0.2439454843 | 1.2322654 | 259 | 4 5 | 8.000000e-01 |
| ## 90 | 0 | 0.5701979438 | 0.5775226642 | 0.4353233 | 262 | 4 5 | 6.000000e-01 |
| ## 91 | 0 | -0.3304240467 | -0.3297931761 | 1.3278839 | 273 | 4 5 | 4.000000e-01 |
| ## 92 | 0 | -0.2762448356 | -0.2324352233 | 1.0738454 | 267 | 4 5 | -6.383782e-16 |
| ## 93 | 0 | 0.1510103526 | 0.1439483185 | 0.8092865 | 278 | 4 5 | 6.000000e-01 |
| ## 94 | 0 | -0.2476677811 | -0.2406824592 | 1.2124781 | 255 | 4 5 | 6.000000e-01 |
| ## 95 | 0 | 0.2265210610 | 0.2328110842 | 0.7949569 | 281 | 4 5 | 6.000000e-01 |
| ## 96 | 0 | -0.0207926585 | -0.0238196215 | 1.1693981 | 267 | 4 5 | 6.000000e-01 |
| ## 97 | 0 | 0.3440922264 | 0.3780309816 | 0.7206017 | 294 | 5 5 | 8.000000e-01 |
| ## 98 | 0 | -0.0222973085 | -0.0211968809 | 0.9718444 | 278 | 5 5 | 3.000000e-01 |
| ## 99 | 0 | -0.0101135120 | -0.0095063487 | 0.9494715 | 295 | 5 5 | -2.000000e-01 |
| ## 100 | 0 | 0.2321045109 | 0.2484144061 | 0.8218552 | 252 | 5 5 | -7.000000e-01 |
| ## 101 | 0 | -0.1383371853 | -0.1487006388 | 1.2236151 | 257 | 5 5 | 9.000000e-01 |
| ## 102 | 0 | 0.1550990372 | 0.1672877727 | 0.9112990 | 282 | 5 5 | 4.000000e-01 |
| ## 103 | 0 | -0.1798216757 | -0.1833666847 | 1.2030807 | 262 | 5 5 | -6.383782e-16 |
| ## 104 | 0 | -0.0847048245 | -0.0933169486 | 1.1949891 | 283 | 5 5 | -6.000000e-01 |
| ## 105 | 0 | -0.0830734430 | -0.0752647369 | 0.9812671 | 263 | 5 5 | 9.000000e-01 |
| ## 106 | 0 | -0.0597192735 | -0.0588730048 | 1.0447022 | 250 | 5 5 | 5.000000e-01 |
| ## 107 | 0 | -0.2114835123 | -0.1829670656 | 1.0481270 | 255 | 5 5 | 1.000000e-01 |
| ## 108 | 0 | -0.0455285834 | -0.0401876278 | 0.9228777 | 269 | 5 5 | -4.000000e-01 |
| ## 109 | 0 | -0.1298971123 | -0.1294067032 | 1.1256313 | 269 | 5 5 | 8.000000e-01 |
| ## 110 | 0 | -0.2526862056 | -0.2582015333 | 1.2800283 | 250 | 5 5 | 5.000000e-01 |
| ## 111 | 0 | -0.1536960485 | -0.1426326932 | 1.0706507 | 274 | 5 5 | 2.000000e-01 |
| ## 112 | 0 | 0.2145300376 | 0.2220626400 | 0.8130495 | 267 | 5 5 | -2.000000e-01 |
| ## 113 | 0 | 0.0562974464 | 0.0626317177 | 1.0498826 | 273 | 5 5 | 8.000000e-01 |
| ## 114 | 0 | 0.0604052530 | 0.0658437282 | 1.0241894 | 272 | 5 5 | 6.000000e-01 |
| ## 115 | 0 | 0.6338671098 | 0.6596500685 | 0.3810256 | 260 | 5 5 | 3.000000e-01 |
| ## 116 | 0 | 0.5239237119 | 0.5540613787 | 0.5034616 | 268 | 5 5 | 1.000000e-01 |
| ## 117 | 0 | 0.1258760855 | 0.1248574255 | 0.8670500 | 279 | 5 5 | 6.000000e-01 |
| ## 118 | 0 | -0.1284187541 | -0.1485791988 | 1.3055691 | 251 | 5 5 | 7.000000e-01 |
| ## 119 | 0 | -0.0273503897 | -0.0278581797 | 1.0464243 | 256 | 5 5 | 6.000000e-01 |
| ## 120 | 0 | 0.0499876321 | 0.0469446129 | 0.8921799 | 251 | 5 5 | 7.000000e-01 |
| ## 121 | 0 | 0.3127869094 | 0.2897750187 | 0.6366545 | 278 | 6 5 | 8.000000e-01 |
| ## 122 | 0 | 0.0863408196 | 0.0801324537 | 0.8479622 | 282 | 6 5 | 3.000000e-01 |
| ## 123 | 0 | 0.4042557430 | 0.4697450307 | 0.6922546 | 270 | 6 5 | -2.000000e-01 |
| ## 124 | 0 | -0.0249140020 | -0.0289649023 | 1.1915602 | 295 | 6 5 | -8.000000e-01 |
| ## 125 | 0 | -0.2620476196 | -0.2549328147 | 1.2277820 | 257 | 6 5 | 9.000000e-01 |

| | | | | | | | | |
|--------|---|---------------|---------------|-----------|-----|---|---|---------------|
| ## 126 | 0 | -0.1341981300 | -0.1360787508 | 1.1500925 | 309 | 6 | 5 | 3.000000e-01 |
| ## 127 | 0 | -0.2124207411 | -0.2044695696 | 1.1670383 | 280 | 6 | 5 | -6.383782e-16 |
| ## 128 | 0 | 0.1601618196 | 0.1419725736 | 0.7444595 | 250 | 6 | 5 | -5.000000e-01 |
| ## 129 | 0 | -0.2072845702 | -0.2159588199 | 1.2578059 | 265 | 6 | 5 | 9.000000e-01 |
| ## 130 | 0 | -0.2117385927 | -0.2083842018 | 1.1925421 | 258 | 6 | 5 | 5.000000e-01 |
| ## 131 | 0 | 0.3918023523 | 0.4378418818 | 0.6796651 | 286 | 6 | 5 | 1.000000e-01 |
| ## 132 | 0 | -0.3539070589 | -0.3175256723 | 1.2147264 | 284 | 6 | 5 | -5.000000e-01 |
| ## 133 | 0 | -0.4801736277 | -0.4355115517 | 1.3424992 | 269 | 6 | 5 | 8.000000e-01 |
| ## 134 | 0 | -0.1850400492 | -0.1962335653 | 1.2567260 | 265 | 6 | 5 | 5.000000e-01 |
| ## 135 | 0 | -0.0143698880 | -0.0132676773 | 0.9365649 | 275 | 6 | 5 | 2.000000e-01 |
| ## 136 | 0 | -0.1162373879 | -0.1118991736 | 1.0745772 | 281 | 6 | 5 | -2.000000e-01 |
| ## 137 | 0 | -0.1121027024 | -0.1007522399 | 0.9995017 | 282 | 6 | 5 | 8.000000e-01 |
| ## 138 | 0 | 0.0493872079 | 0.0539474436 | 1.0383889 | 251 | 6 | 5 | 7.000000e-01 |
| ## 139 | 0 | 0.2211872793 | 0.2165076664 | 0.7623355 | 283 | 6 | 5 | 3.000000e-01 |
| ## 140 | 0 | 0.0713118203 | 0.0627425767 | 0.8170916 | 255 | 6 | 5 | 2.000000e-01 |
| ## 141 | 0 | -0.2614247981 | -0.2723769355 | 1.3142710 | 284 | 6 | 5 | 6.000000e-01 |
| ## 142 | 0 | 0.0960864714 | 0.0956981846 | 0.9002608 | 264 | 6 | 5 | 6.000000e-01 |
| ## 143 | 0 | -0.1295095420 | -0.0878474369 | 0.7661560 | 267 | 6 | 5 | 7.000000e-01 |
| ## 144 | 0 | -0.1034617303 | -0.1171167532 | 1.2490981 | 257 | 6 | 5 | 7.000000e-01 |
| ## 145 | 0 | 0.0084852503 | 0.0080300753 | 0.9383268 | 301 | 7 | 5 | 8.000000e-01 |
| ## 146 | 0 | 0.5223307173 | 0.4539683917 | 0.4151522 | 281 | 7 | 5 | 3.000000e-01 |
| ## 147 | 0 | -0.0111860967 | -0.0126371190 | 1.1423537 | 299 | 7 | 5 | -2.000000e-01 |
| ## 148 | 0 | -0.0853361397 | -0.0834657259 | 1.0615475 | 290 | 7 | 5 | -8.000000e-01 |
| ## 149 | 0 | 0.0748977140 | 0.0658046957 | 0.8127895 | 276 | 7 | 5 | 8.000000e-01 |
| ## 150 | 0 | -0.2177712269 | -0.2041977812 | 1.1418689 | 279 | 7 | 5 | 4.000000e-01 |
| ## 151 | 0 | -0.1877360163 | -0.1913906530 | 1.2108575 | 263 | 7 | 5 | -6.383782e-16 |
| ## 152 | 0 | 0.0805798168 | 0.0765694898 | 0.8736621 | 278 | 7 | 5 | -6.000000e-01 |
| ## 153 | 0 | 0.1956954137 | 0.1630740639 | 0.6702314 | 257 | 7 | 5 | 9.000000e-01 |
| ## 154 | 0 | 0.2094901333 | 0.2155961638 | 0.8135509 | 289 | 7 | 5 | 4.000000e-01 |
| ## 155 | 0 | -0.1815048848 | -0.1811765325 | 1.1793675 | 270 | 7 | 5 | 1.000000e-01 |
| ## 156 | 0 | -0.4358927472 | -0.4417751041 | 1.4552701 | 268 | 7 | 5 | -4.000000e-01 |
| ## 157 | 0 | 0.1426047780 | 0.1359042707 | 0.8171092 | 267 | 7 | 5 | 8.000000e-01 |
| ## 158 | 0 | -0.1337832912 | -0.1444190367 | 1.2239188 | 253 | 7 | 5 | 5.000000e-01 |
| ## 159 | 0 | 0.1115305211 | 0.1158341999 | 0.9227533 | 273 | 7 | 5 | 2.000000e-01 |
| ## 160 | 0 | 0.0745962134 | 0.0684470227 | 0.8491200 | 268 | 7 | 5 | -2.000000e-01 |
| ## 161 | 0 | -0.0827974791 | -0.0861834628 | 1.1270782 | 266 | 7 | 5 | 8.000000e-01 |
| ## 162 | 0 | 0.0207779579 | 0.0202070373 | 0.9523157 | 285 | 7 | 5 | 5.000000e-01 |
| ## 163 | 0 | 0.0681726076 | 0.0607539963 | 0.8304250 | 272 | 7 | 5 | 3.000000e-01 |
| ## 164 | 0 | 0.0144451327 | 0.0153981758 | 1.0505786 | 252 | 7 | 5 | 1.000000e-01 |
| ## 165 | 0 | -0.3818334930 | -0.3833653607 | 1.3873772 | 263 | 7 | 5 | 6.000000e-01 |
| ## 166 | 0 | 0.1125781940 | 0.0994040911 | 0.7835741 | 257 | 7 | 5 | 7.000000e-01 |
| ## 167 | 0 | -0.0992678481 | -0.0764242516 | 0.8463035 | 271 | 7 | 5 | 7.000000e-01 |
| ## 168 | 0 | -0.1674908626 | -0.1541388551 | 1.0744210 | 258 | 7 | 5 | 7.000000e-01 |
| ## 169 | 0 | -0.0551485577 | -0.0503644769 | 0.9636155 | 279 | 8 | 5 | 8.000000e-01 |
| ## 170 | 0 | -0.2602586907 | -0.2539725548 | 1.2298191 | 274 | 8 | 5 | 3.000000e-01 |
| ## 171 | 0 | -0.0363362807 | -0.0368517659 | 1.0510383 | 307 | 8 | 5 | -2.000000e-01 |
| ## 172 | 0 | -0.5081744619 | -0.6060217686 | 1.7985685 | 296 | 8 | 5 | -8.000000e-01 |
| ## 173 | 0 | -0.0709845615 | -0.0733563188 | 1.1067686 | 305 | 8 | 5 | 8.000000e-01 |
| ## 174 | 0 | -0.0751545181 | -0.0664685920 | 0.9508944 | 251 | 8 | 5 | 4.000000e-01 |
| ## 175 | 0 | -0.0569830225 | -0.0600939589 | 1.1146881 | 283 | 8 | 5 | -6.383782e-16 |
| ## 176 | 0 | -0.1498559206 | -0.1165535828 | 0.8943245 | 295 | 8 | 5 | -6.000000e-01 |
| ## 177 | 0 | 0.1192529065 | 0.1293919678 | 0.9556295 | 273 | 8 | 5 | 8.000000e-01 |
| ## 178 | 0 | 0.0062419259 | 0.0066350700 | 1.0563494 | 255 | 8 | 5 | 5.000000e-01 |
| ## 179 | 0 | -0.2059488944 | -0.1860404325 | 1.0893734 | 263 | 8 | 5 | 1.000000e-01 |

| | | | | | | | | |
|--------|---|---------------|---------------|-----------|-----|----|---|---------------|
| ## 180 | 0 | -0.1217764304 | -0.1138821473 | 1.0490561 | 272 | 8 | 5 | -4.000000e-01 |
| ## 181 | 0 | -0.0053478778 | -0.0053609456 | 1.0078045 | 279 | 8 | 5 | 8.000000e-01 |
| ## 182 | 0 | -0.2898490143 | -0.3036513793 | 1.3512705 | 253 | 8 | 5 | 5.000000e-01 |
| ## 183 | 0 | 0.3520425086 | 0.3357193064 | 0.6179136 | 257 | 8 | 5 | 2.000000e-01 |
| ## 184 | 0 | 0.1657337439 | 0.1761408495 | 0.8866533 | 270 | 8 | 5 | -2.000000e-01 |
| ## 185 | 0 | 0.1391192116 | 0.1470826423 | 0.9101591 | 270 | 8 | 5 | 8.000000e-01 |
| ## 186 | 0 | 0.0230307362 | 0.0234322235 | 0.9940005 | 268 | 8 | 5 | 5.000000e-01 |
| ## 187 | 0 | 0.0020575719 | 0.0021281598 | 1.0321782 | 253 | 8 | 5 | 4.000000e-01 |
| ## 188 | 0 | 0.0349500581 | 0.0342812353 | 0.9465822 | 263 | 8 | 5 | 1.000000e-01 |
| ## 189 | 0 | 0.0452405290 | 0.0384084346 | 0.8105744 | 264 | 8 | 5 | 6.000000e-01 |
| ## 190 | 0 | 0.0353669928 | 0.0390070750 | 1.0639161 | 252 | 8 | 5 | 7.000000e-01 |
| ## 191 | 0 | -0.1289153482 | -0.1156495801 | 1.0127466 | 261 | 8 | 5 | 6.000000e-01 |
| ## 192 | 0 | 0.1206589299 | 0.1357885415 | 0.9896030 | 254 | 8 | 5 | 7.000000e-01 |
| ## 193 | 0 | 0.2756455255 | 0.2819577666 | 0.7409421 | 282 | 9 | 5 | 8.000000e-01 |
| ## 194 | 0 | -0.3036402884 | -0.3222140938 | 1.3833845 | 258 | 9 | 5 | 4.000000e-01 |
| ## 195 | 0 | 0.0003842758 | 0.0003873071 | 1.0075011 | 301 | 9 | 5 | -2.000000e-01 |
| ## 196 | 0 | 0.0939402835 | 0.0937561528 | 0.9042838 | 283 | 9 | 5 | -8.000000e-01 |
| ## 197 | 0 | -0.3537444020 | -0.3979852993 | 1.5230499 | 292 | 9 | 5 | 8.000000e-01 |
| ## 198 | 0 | 0.2471198965 | 0.2506261531 | 0.7635623 | 263 | 9 | 5 | 4.000000e-01 |
| ## 199 | 0 | 0.1971146416 | 0.2151083901 | 0.8761773 | 266 | 9 | 5 | -6.383782e-16 |
| ## 200 | 0 | -0.2113796963 | -0.2101865285 | 1.2045419 | 269 | 9 | 5 | -6.000000e-01 |
| ## 201 | 0 | -0.0671523630 | -0.0704766587 | 1.1199804 | 262 | 9 | 5 | 9.000000e-01 |
| ## 202 | 0 | -0.2000277666 | -0.2265118855 | 1.3589141 | 298 | 9 | 5 | 4.000000e-01 |
| ## 203 | 0 | -0.3550265014 | -0.3552362615 | 1.3558271 | 251 | 9 | 5 | 1.000000e-01 |
| ## 204 | 0 | 0.1746167991 | 0.1439083583 | 0.6802297 | 265 | 9 | 5 | -4.000000e-01 |
| ## 205 | 0 | 0.3876654477 | 0.3917446551 | 0.6187778 | 289 | 9 | 5 | 8.000000e-01 |
| ## 206 | 0 | 0.1984897623 | 0.1898887167 | 0.7667788 | 251 | 9 | 5 | 6.000000e-01 |
| ## 207 | 0 | -0.0627924733 | -0.0618639912 | 1.0470775 | 260 | 9 | 5 | 3.000000e-01 |
| ## 208 | 0 | -0.1716537712 | -0.1919886756 | 1.3104533 | 274 | 9 | 5 | -2.000000e-01 |
| ## 209 | 0 | -0.1477715420 | -0.1503960544 | 1.1681567 | 266 | 9 | 5 | 8.000000e-01 |
| ## 210 | 0 | 0.0309382629 | 0.0282070120 | 0.8835123 | 256 | 9 | 5 | 6.000000e-01 |
| ## 211 | 0 | -0.0764691625 | -0.0772459167 | 1.0874037 | 279 | 9 | 5 | 3.000000e-01 |
| ## 212 | 0 | -0.0989922908 | -0.0974101553 | 1.0814277 | 270 | 9 | 5 | 1.000000e-01 |
| ## 213 | 0 | -0.1290466275 | -0.1525781616 | 1.3349272 | 263 | 9 | 5 | 6.000000e-01 |
| ## 214 | 0 | 0.0739695819 | 0.0649488125 | 0.8130988 | 273 | 9 | 5 | 6.000000e-01 |
| ## 215 | 0 | 0.3628492611 | 0.3626568405 | 0.6368129 | 283 | 9 | 5 | 6.000000e-01 |
| ## 216 | 0 | -0.3571192150 | -0.3857210238 | 1.4658114 | 251 | 9 | 5 | 7.000000e-01 |
| ## 217 | 0 | -0.1659185342 | -0.1425893831 | 1.0019833 | 276 | 10 | 5 | 8.000000e-01 |
| ## 218 | 0 | 0.1482744816 | 0.1476491513 | 0.8481335 | 279 | 10 | 5 | 3.000000e-01 |
| ## 219 | 0 | 0.1068045717 | 0.0983631913 | 0.8226010 | 277 | 10 | 5 | -2.000000e-01 |
| ## 220 | 0 | 0.0437845863 | 0.0403134898 | 0.8804098 | 269 | 10 | 5 | -7.000000e-01 |
| ## 221 | 0 | 0.0583185506 | 0.0578191392 | 0.9336174 | 250 | 10 | 5 | 9.000000e-01 |
| ## 222 | 0 | 0.0041097252 | 0.0040976653 | 0.9929679 | 280 | 10 | 5 | 4.000000e-01 |
| ## 223 | 0 | -0.0330167873 | -0.0336632853 | 1.0532442 | 254 | 10 | 5 | -6.383782e-16 |
| ## 224 | 0 | -0.1080009725 | -0.1025068287 | 1.0516356 | 253 | 10 | 5 | -5.000000e-01 |
| ## 225 | 0 | -0.0689746840 | -0.0683269101 | 1.0589354 | 266 | 10 | 5 | 9.000000e-01 |
| ## 226 | 0 | 0.0084994371 | 0.0074721071 | 0.8716575 | 295 | 10 | 5 | 4.000000e-01 |
| ## 227 | 0 | 0.0893033734 | 0.0919699945 | 0.9378903 | 258 | 10 | 5 | 1.000000e-01 |
| ## 228 | 0 | 0.0796351045 | 0.0817660741 | 0.9449931 | 274 | 10 | 5 | -4.000000e-01 |
| ## 229 | 0 | -0.2287039505 | -0.2353497813 | 1.2644084 | 289 | 10 | 5 | 8.000000e-01 |
| ## 230 | 0 | 0.2967547091 | 0.3047522846 | 0.7221978 | 276 | 10 | 5 | 5.000000e-01 |
| ## 231 | 0 | -0.1155622114 | -0.1013139546 | 0.9780188 | 253 | 10 | 5 | 2.000000e-01 |
| ## 232 | 0 | 0.1002671434 | 0.1091710696 | 0.9796310 | 267 | 10 | 5 | -2.000000e-01 |
| ## 233 | 0 | 0.1336441371 | 0.1240234876 | 0.8039894 | 274 | 10 | 5 | 8.000000e-01 |

```

## 234      0  0.1284412705  0.1393173711  0.9453602  271  10  5  6.000000e-01
## 235      0  0.1127710008  0.1264806399  0.9950900  267  10  5  4.000000e-01
## 236      0  0.1629112453  0.1544882647  0.7938089  261  10  5  1.000000e-01
## 237      0 -0.0302958473 -0.0316538491  1.0764785  257  10  5  7.000000e-01
## 238      0 -0.4929369162 -0.5011243137  1.5177337  268  10  5  7.000000e-01
## 239      0  0.0817658875  0.0846783984  0.9509417  260  10  5  7.000000e-01
## 240      0 -0.1787459870 -0.1817429944  1.1985098  269  10  5  6.000000e-01
##      n rho
## 1      1 0.0
## 2      2 0.0
## 3      3 0.0
## 4      4 0.0
## 5      1 0.2
## 6      2 0.2
## 7      3 0.2
## 8      4 0.2
## 9      1 0.4
## 10     2 0.4
## 11     3 0.4
## 12     4 0.4
## 13     1 0.6
## 14     2 0.6
## 15     3 0.6
## 16     4 0.6
## 17     1 0.8
## 18     2 0.8
## 19     3 0.8
## 20     4 0.8
## 21     1 1.0
## 22     2 1.0
## 23     3 1.0
## 24     4 1.0
## 25     1 0.0
## 26     2 0.0
## 27     3 0.0
## 28     4 0.0
## 29     1 0.2
## 30     2 0.2
## 31     3 0.2
## 32     4 0.2
## 33     1 0.4
## 34     2 0.4
## 35     3 0.4
## 36     4 0.4
## 37     1 0.6
## 38     2 0.6
## 39     3 0.6
## 40     4 0.6
## 41     1 0.8
## 42     2 0.8
## 43     3 0.8
## 44     4 0.8
## 45     1 1.0
## 46     2 1.0

```

47 3 1.0
48 4 1.0
49 1 0.0
50 2 0.0
51 3 0.0
52 4 0.0
53 1 0.2
54 2 0.2
55 3 0.2
56 4 0.2
57 1 0.4
58 2 0.4
59 3 0.4
60 4 0.4
61 1 0.6
62 2 0.6
63 3 0.6
64 4 0.6
65 1 0.8
66 2 0.8
67 3 0.8
68 4 0.8
69 1 1.0
70 2 1.0
71 3 1.0
72 4 1.0
73 1 0.0
74 2 0.0
75 3 0.0
76 4 0.0
77 1 0.2
78 2 0.2
79 3 0.2
80 4 0.2
81 1 0.4
82 2 0.4
83 3 0.4
84 4 0.4
85 1 0.6
86 2 0.6
87 3 0.6
88 4 0.6
89 1 0.8
90 2 0.8
91 3 0.8
92 4 0.8
93 1 1.0
94 2 1.0
95 3 1.0
96 4 1.0
97 1 0.0
98 2 0.0
99 3 0.0
100 4 0.0

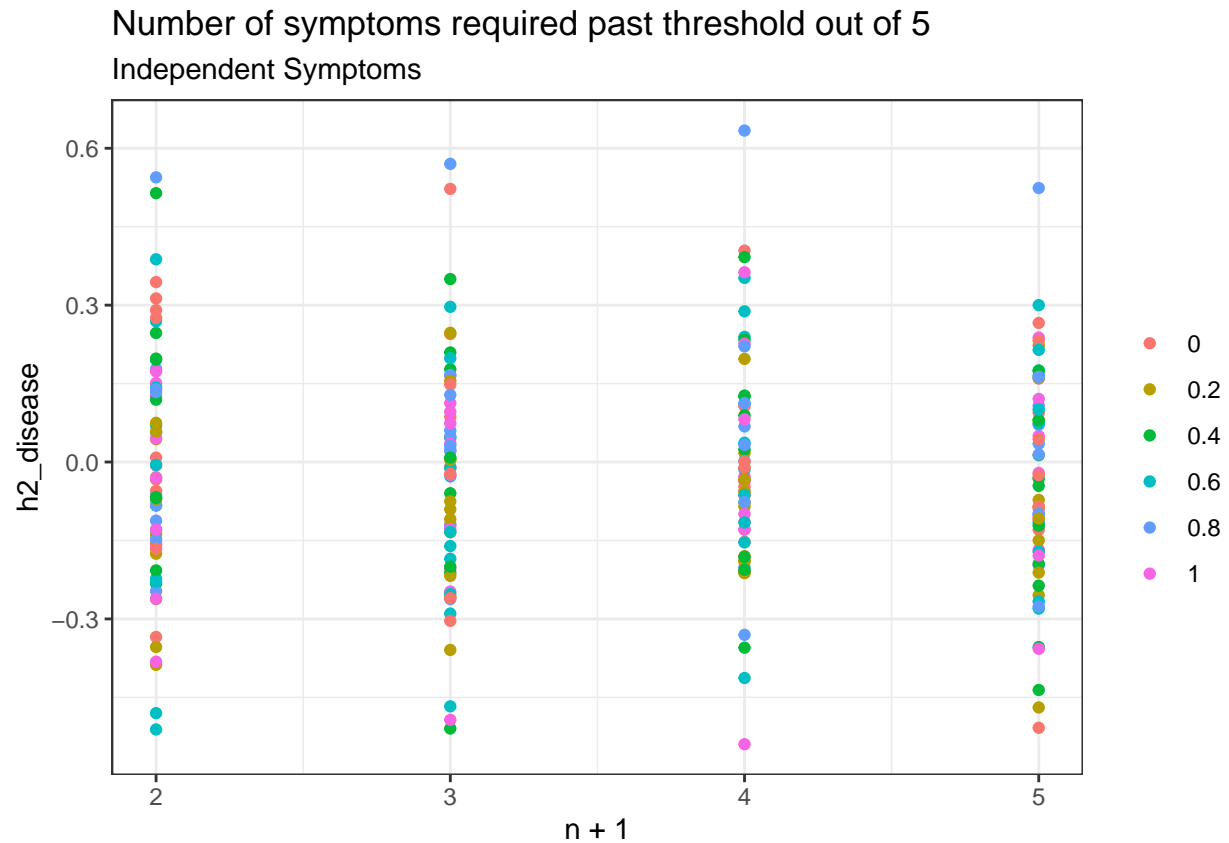
101 1 0.2
102 2 0.2
103 3 0.2
104 4 0.2
105 1 0.4
106 2 0.4
107 3 0.4
108 4 0.4
109 1 0.6
110 2 0.6
111 3 0.6
112 4 0.6
113 1 0.8
114 2 0.8
115 3 0.8
116 4 0.8
117 1 1.0
118 2 1.0
119 3 1.0
120 4 1.0
121 1 0.0
122 2 0.0
123 3 0.0
124 4 0.0
125 1 0.2
126 2 0.2
127 3 0.2
128 4 0.2
129 1 0.4
130 2 0.4
131 3 0.4
132 4 0.4
133 1 0.6
134 2 0.6
135 3 0.6
136 4 0.6
137 1 0.8
138 2 0.8
139 3 0.8
140 4 0.8
141 1 1.0
142 2 1.0
143 3 1.0
144 4 1.0
145 1 0.0
146 2 0.0
147 3 0.0
148 4 0.0
149 1 0.2
150 2 0.2
151 3 0.2
152 4 0.2
153 1 0.4
154 2 0.4

155 3 0.4
156 4 0.4
157 1 0.6
158 2 0.6
159 3 0.6
160 4 0.6
161 1 0.8
162 2 0.8
163 3 0.8
164 4 0.8
165 1 1.0
166 2 1.0
167 3 1.0
168 4 1.0
169 1 0.0
170 2 0.0
171 3 0.0
172 4 0.0
173 1 0.2
174 2 0.2
175 3 0.2
176 4 0.2
177 1 0.4
178 2 0.4
179 3 0.4
180 4 0.4
181 1 0.6
182 2 0.6
183 3 0.6
184 4 0.6
185 1 0.8
186 2 0.8
187 3 0.8
188 4 0.8
189 1 1.0
190 2 1.0
191 3 1.0
192 4 1.0
193 1 0.0
194 2 0.0
195 3 0.0
196 4 0.0
197 1 0.2
198 2 0.2
199 3 0.2
200 4 0.2
201 1 0.4
202 2 0.4
203 3 0.4
204 4 0.4
205 1 0.6
206 2 0.6
207 3 0.6
208 4 0.6

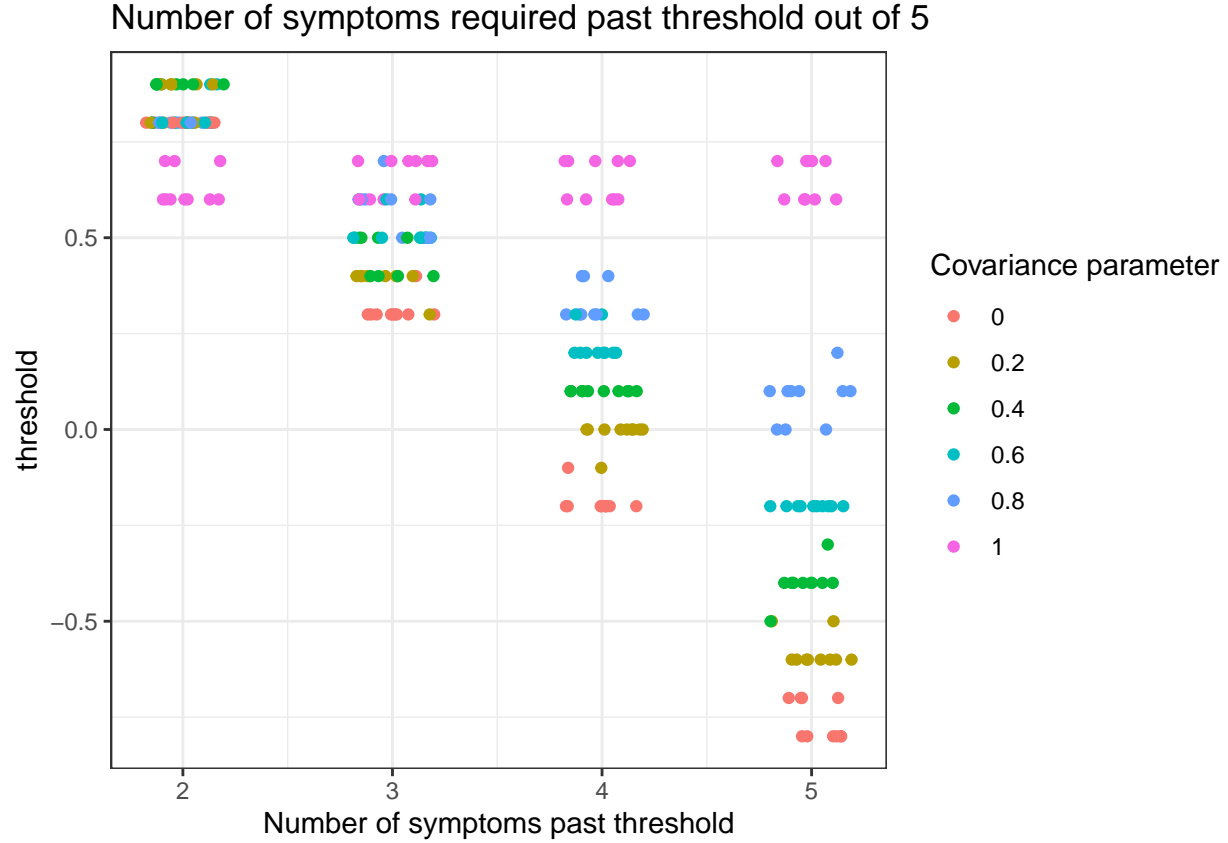
```
## 209 1 0.8
## 210 2 0.8
## 211 3 0.8
## 212 4 0.8
## 213 1 1.0
## 214 2 1.0
## 215 3 1.0
## 216 4 1.0
## 217 1 0.0
## 218 2 0.0
## 219 3 0.0
## 220 4 0.0
## 221 1 0.2
## 222 2 0.2
## 223 3 0.2
## 224 4 0.2
## 225 1 0.4
## 226 2 0.4
## 227 3 0.4
## 228 4 0.4
## 229 1 0.6
## 230 2 0.6
## 231 3 0.6
## 232 4 0.6
## 233 1 0.8
## 234 2 0.8
## 235 3 0.8
## 236 4 0.8
## 237 1 1.0
## 238 2 1.0
## 239 3 1.0
## 240 4 1.0
```

```
rows_n <- rows_n %>% mutate(h2_l = h2_disease * (prev/N) * (1-prev/N) / dnorm(prev/N)^2)
```

```
ggplot(rows_n,aes(x=n+1,y=h2_disease)) +
  geom_point(aes(col=factor(rho))) +
  #geom_point(aes(y=h2_l,col="expected h2_l (one symptom)")) +
  labs(title = paste("Number of symptoms required past threshold out of",p),
       col="",
       subtitle = "Independent Symptoms")
```



```
ggplot(rows_n,aes(x=n+1,y=c)) +
  geom_jitter(aes(col=factor(rho)),height = 0,width=0.2) +
  #geom_point(aes(y=h2_l,col="expected h2_l (one symptom)")) +
  labs(title = paste("Number of symptoms required past threshold out of",p),
       col="Covariance parameter",
       x="Number of symptoms past threshold",
       y="threshold")
```



Symptoms are not heritable, but covariance is heritable

We model genetic effects on covariance through the diagonal matrix D in the LDL^T decomposition of Σ . This works in the following way:

D is an $(N \times P)$ matrix of diagonal entries. Each entry of D is independent of the others, but individuals co-vary in accordance with their kinship:

$$D \sim MN(\mathbf{M}, \sigma_{cov,e}^2 \mathbf{I}_n + \sigma_{cov,g}^2 \mathbf{K}, \mathbf{I}_P)$$

where \mathbf{M} is an $(N \times P)$ matrix where each row is identical, and is the vector σ_X^2 . Between rows, there is independent environmental noise as well as genetic effects.

$$D = G\beta_{cov} + \epsilon$$

The effect size matrix is $(P \times l)$. $\epsilon_i \sim N(\vec{0}^P, \sigma_{cov,e}^2)$. Since everyone has slightly different D , each individual's personal symptom covariance matrix varies:

$$\Sigma_i = LD_iL^T$$

And from this, the symptoms are drawn:

$$X_i \sim N(\vec{0}^P, \Sigma_i)$$

```

rows_hercov <- data.frame()
reps <- 10
p <- 5
her <- 0

L <- matrix(0,nrow=p,ncol=p)
L[lower.tri(L,diag=T)] <- 1

for (r in c(1:reps)){
  print(r)
  for (hercov in seq(0,1,0.2)){
    for (n in c(1:(p-1))){
      print(paste("Running for rep",r, "heritability", her, "threshold number", n, "covariance heritability", hercov))
      G <- simulate_genotypes(N = N,L = 1)
      G <- scale(G)

      # effect sizes on D
      beta_cov <- matrix(mvrnorm(n=1,mu = rep(0,p),Sigma = diag(p)),nrow=1) %*% diag(3,p,p) * sqrt(hercov)
      e_cov <- matrix(mvrnorm(n=N,mu = rep(0,p),Sigma = diag(p)),nrow=N) %*% diag(3,p,p) * sqrt(1-hercov)
      # individual-level D
      D_vectors <- G %*% beta_cov + e_cov + matrix(10,nrow=N,ncol=p)
      D_vectors[D_vectors<0] <- 0.001

      # effect sizes on trait directly
      beta <- matrix(mvrnorm(n=1,mu = rep(0,p),Sigma = diag(5,p,p)),nrow=1) %*% diag(1,p,p) * sqrt(hercov)
      e <- matrix(mvrnorm(n=N,mu = rep(0,p),Sigma = diag(5,p,p)),nrow=N) * sqrt(1-hercov)

      X <- matrix(0,nrow=N,ncol=p)
      # Give each person a covariance matrix and draw symptoms
      for (ind in c(1:N)){
        # make into matrix
        Sig_ind <- L %*% diag(D_vectors[ind,]) %*% t(L)
        beta_transformed <- t(chol(Sig_ind)) %*% t(beta) %>% t() # check this
        e_transformed <- t(chol(Sig_ind)) %*% e[ind,] %>% t() # check this
        X[ind,] <- G[ind,] %*% beta_transformed + e_transformed
      }

      # setting the threshold to keep constant prevalence
      c <- 10
      Y <- apply(X,1,MDD_RISK,threshold=c,n=n)
      prev <- sum(Y)/N

      while (prev<0.25){
        c <- c - 0.1
        Y <- apply(X,1,MDD_RISK,threshold=c,n=n)
        prev <- sum(Y)/N
      }

      print(paste("Set threshold",c,"and prevalence",prev))
      res <- GREML(Y,G)
      h2 <- res$h2

      rows_hercov <- rbind(rows_hercov,data.frame("h2_symptoms"=her,

```

```

        "h2_disease"=h2,
        "sig2g"=res$sig2g,
        "sig2e"=res$sig2e,
        "prev"=sum(Y),
        "rep"=r,
        "P"=p,
        "c"=c,
        "n"=n,
        "hercov"=hercov))
    }
}
}

```

```

## [1] 1
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 10 and prevalence 0.268"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 7.000000000000001 and prevalence 0.252"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 3.400000000000002 and prevalence 0.254"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold 0.4000000000000019 and prevalence 0.253"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 10 and prevalence 0.265"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 6.700000000000001 and prevalence 0.25"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 4.100000000000002 and prevalence 0.252"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -0.299999999999981 and prevalence 0.25"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 9.3 and prevalence 0.258"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 7.700000000000001 and prevalence 0.25"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 3.200000000000002 and prevalence 0.251"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold -0.199999999999981 and prevalence 0.25"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 10 and prevalence 0.278"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 7.600000000000001 and prevalence 0.251"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 4.300000000000002 and prevalence 0.251"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold 0.5000000000000019 and prevalence 0.251"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.252"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 7.900000000000001 and prevalence 0.253"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 3.100000000000002 and prevalence 0.256"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0.8"

```

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## [1] "Set threshold -0.599999999999981 and prevalence 0.252"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 9.8 and prevalence 0.251"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 6.900000000000001 and prevalence 0.25"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 3.800000000000002 and prevalence 0.254"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold 1.87905246917808e-14 and prevalence 0.253"
## [1] 2
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 10 and prevalence 0.273"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 7.000000000000001 and prevalence 0.25"
## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 4.200000000000002 and prevalence 0.252"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -0.699999999999981 and prevalence 0.253"
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 10 and prevalence 0.256"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 6.300000000000001 and prevalence 0.252"
## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 4.100000000000002 and prevalence 0.25"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -0.399999999999981 and prevalence 0.252"
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 10 and prevalence 0.27"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 6.800000000000001 and prevalence 0.252"
## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 4.400000000000002 and prevalence 0.25"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold -0.699999999999981 and prevalence 0.25"
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 10 and prevalence 0.265"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 7.000000000000001 and prevalence 0.253"
## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 3.900000000000002 and prevalence 0.254"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -0.499999999999981 and prevalence 0.253"
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.274"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 7.600000000000001 and prevalence 0.253"
## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 3.700000000000002 and prevalence 0.254"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -0.199999999999981 and prevalence 0.253"
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 9.9 and prevalence 0.251"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 6.900000000000001 and prevalence 0.254"

```

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## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 3.40000000000002 and prevalence 0.25"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold -0.599999999999981 and prevalence 0.252"
## [1] 3
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 10 and prevalence 0.27"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 7.30000000000001 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 3.70000000000002 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -0.299999999999981 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 9.9 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 6.90000000000001 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 3.80000000000002 and prevalence 0.254"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold 0.300000000000019 and prevalence 0.251"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 10 and prevalence 0.272"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 6.90000000000001 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 3.80000000000002 and prevalence 0.251"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold 0.200000000000019 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 10 and prevalence 0.268"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 8.00000000000001 and prevalence 0.251"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 3.70000000000002 and prevalence 0.251"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -0.399999999999981 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.27"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 6.80000000000001 and prevalence 0.254"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 3.60000000000002 and prevalence 0.251"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold 0.100000000000019 and prevalence 0.251"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 9.3 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 7.20000000000001 and prevalence 0.252"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 3.50000000000002 and prevalence 0.25"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold 0.200000000000019 and prevalence 0.255"
## [1] 4

```


[illegible]

```

## [1] "Set threshold 3.300000000000002 and prevalence 0.251"
## [1] "Running for rep 5 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -0.499999999999981 and prevalence 0.251"
## [1] "Running for rep 5 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 10 and prevalence 0.252"
## [1] "Running for rep 5 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 6.900000000000001 and prevalence 0.25"
## [1] "Running for rep 5 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 2.900000000000002 and prevalence 0.251"
## [1] "Running for rep 5 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -0.299999999999981 and prevalence 0.25"
## [1] "Running for rep 5 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 9.7 and prevalence 0.25"
## [1] "Running for rep 5 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 7.300000000000001 and prevalence 0.253"
## [1] "Running for rep 5 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 4.600000000000002 and prevalence 0.252"
## [1] "Running for rep 5 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold 0.200000000000019 and prevalence 0.253"
## [1] "Running for rep 5 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 10 and prevalence 0.25"
## [1] "Running for rep 5 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 6.700000000000001 and prevalence 0.253"
## [1] "Running for rep 5 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 4.400000000000002 and prevalence 0.254"
## [1] "Running for rep 5 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -0.0999999999999812 and prevalence 0.251"
## [1] "Running for rep 5 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 9.8 and prevalence 0.253"
## [1] "Running for rep 5 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 7.400000000000001 and prevalence 0.255"
## [1] "Running for rep 5 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 4.000000000000002 and prevalence 0.251"
## [1] "Running for rep 5 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -0.0999999999999812 and prevalence 0.254"
## [1] "Running for rep 5 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 10 and prevalence 0.262"
## [1] "Running for rep 5 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 7.900000000000001 and prevalence 0.252"
## [1] "Running for rep 5 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 3.000000000000002 and prevalence 0.252"
## [1] "Running for rep 5 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold -0.899999999999981 and prevalence 0.253"
## [1] 6
## [1] "Running for rep 6 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 10 and prevalence 0.259"
## [1] "Running for rep 6 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 6.700000000000001 and prevalence 0.25"
## [1] "Running for rep 6 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 3.800000000000002 and prevalence 0.251"
## [1] "Running for rep 6 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -0.199999999999981 and prevalence 0.251"
## [1] "Running for rep 6 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 10 and prevalence 0.251"

```

```

## [1] "Running for rep 6 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 7.300000000000001 and prevalence 0.256"
## [1] "Running for rep 6 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 3.900000000000002 and prevalence 0.252"
## [1] "Running for rep 6 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -0.499999999999981 and prevalence 0.254"
## [1] "Running for rep 6 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 10 and prevalence 0.268"
## [1] "Running for rep 6 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 7.600000000000001 and prevalence 0.254"
## [1] "Running for rep 6 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 3.300000000000002 and prevalence 0.256"
## [1] "Running for rep 6 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold 0.3000000000000019 and prevalence 0.252"
## [1] "Running for rep 6 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 10 and prevalence 0.254"
## [1] "Running for rep 6 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 7.300000000000001 and prevalence 0.252"
## [1] "Running for rep 6 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 3.900000000000002 and prevalence 0.254"
## [1] "Running for rep 6 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -0.0999999999999812 and prevalence 0.255"
## [1] "Running for rep 6 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.285"
## [1] "Running for rep 6 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 7.800000000000001 and prevalence 0.255"
## [1] "Running for rep 6 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 2.700000000000002 and prevalence 0.252"
## [1] "Running for rep 6 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold 1.87905246917808e-14 and prevalence 0.251"
## [1] "Running for rep 6 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 10 and prevalence 0.276"
## [1] "Running for rep 6 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 6.700000000000001 and prevalence 0.252"
## [1] "Running for rep 6 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 3.400000000000002 and prevalence 0.251"
## [1] "Running for rep 6 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold 1.87905246917808e-14 and prevalence 0.253"
## [1] 7
## [1] "Running for rep 7 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 10 and prevalence 0.252"
## [1] "Running for rep 7 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 8.000000000000001 and prevalence 0.252"
## [1] "Running for rep 7 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 3.100000000000002 and prevalence 0.251"
## [1] "Running for rep 7 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -0.199999999999981 and prevalence 0.254"
## [1] "Running for rep 7 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 10 and prevalence 0.264"
## [1] "Running for rep 7 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 6.700000000000001 and prevalence 0.252"
## [1] "Running for rep 7 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 4.200000000000002 and prevalence 0.251"
## [1] "Running for rep 7 heritability 0 threshold number 4 covariance heritability 0.2"

```

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## [1] "Set threshold 1.87905246917808e-14 and prevalence 0.25"
## [1] "Running for rep 7 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 10 and prevalence 0.27"
## [1] "Running for rep 7 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 6.70000000000001 and prevalence 0.252"
## [1] "Running for rep 7 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 3.10000000000002 and prevalence 0.252"
## [1] "Running for rep 7 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold 0.300000000000019 and prevalence 0.25"
## [1] "Running for rep 7 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 9.7 and prevalence 0.25"
## [1] "Running for rep 7 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 6.60000000000001 and prevalence 0.251"
## [1] "Running for rep 7 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 3.80000000000002 and prevalence 0.254"
## [1] "Running for rep 7 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -0.599999999999981 and prevalence 0.25"
## [1] "Running for rep 7 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.272"
## [1] "Running for rep 7 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 6.40000000000001 and prevalence 0.251"
## [1] "Running for rep 7 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 3.20000000000002 and prevalence 0.253"
## [1] "Running for rep 7 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -0.199999999999981 and prevalence 0.25"
## [1] "Running for rep 7 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 9.5 and prevalence 0.252"
## [1] "Running for rep 7 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 6.60000000000001 and prevalence 0.254"
## [1] "Running for rep 7 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 4.90000000000002 and prevalence 0.253"
## [1] "Running for rep 7 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold 0.400000000000019 and prevalence 0.253"
## [1] 8
## [1] "Running for rep 8 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 9.9 and prevalence 0.25"
## [1] "Running for rep 8 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 7.10000000000001 and prevalence 0.251"
## [1] "Running for rep 8 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 3.40000000000002 and prevalence 0.251"
## [1] "Running for rep 8 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold 1.87905246917808e-14 and prevalence 0.253"
## [1] "Running for rep 8 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 9.8 and prevalence 0.253"
## [1] "Running for rep 8 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 7.40000000000001 and prevalence 0.252"
## [1] "Running for rep 8 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 4.00000000000002 and prevalence 0.253"
## [1] "Running for rep 8 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -0.199999999999981 and prevalence 0.254"
## [1] "Running for rep 8 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 10 and prevalence 0.261"
## [1] "Running for rep 8 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 7.00000000000001 and prevalence 0.253"

```

```

## [1] "Running for rep 8 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 4.20000000000002 and prevalence 0.25"
## [1] "Running for rep 8 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold 0.400000000000019 and prevalence 0.25"
## [1] "Running for rep 8 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 10 and prevalence 0.273"
## [1] "Running for rep 8 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 6.60000000000001 and prevalence 0.251"
## [1] "Running for rep 8 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 3.40000000000002 and prevalence 0.251"
## [1] "Running for rep 8 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -0.699999999999981 and prevalence 0.25"
## [1] "Running for rep 8 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.253"
## [1] "Running for rep 8 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 6.80000000000001 and prevalence 0.25"
## [1] "Running for rep 8 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 3.10000000000002 and prevalence 0.254"
## [1] "Running for rep 8 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -0.299999999999981 and prevalence 0.251"
## [1] "Running for rep 8 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 10 and prevalence 0.266"
## [1] "Running for rep 8 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 6.90000000000001 and prevalence 0.252"
## [1] "Running for rep 8 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 4.30000000000002 and prevalence 0.25"
## [1] "Running for rep 8 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold -0.199999999999981 and prevalence 0.253"
## [1] 9
## [1] "Running for rep 9 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 10 and prevalence 0.253"
## [1] "Running for rep 9 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 7.40000000000001 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 4.00000000000002 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -0.899999999999981 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 9.9 and prevalence 0.25"
## [1] "Running for rep 9 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 6.30000000000001 and prevalence 0.253"
## [1] "Running for rep 9 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 3.40000000000002 and prevalence 0.252"
## [1] "Running for rep 9 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold 1.87905246917808e-14 and prevalence 0.252"
## [1] "Running for rep 9 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 10 and prevalence 0.254"
## [1] "Running for rep 9 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 6.40000000000001 and prevalence 0.252"
## [1] "Running for rep 9 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 3.60000000000002 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold -0.499999999999981 and prevalence 0.253"
## [1] "Running for rep 9 heritability 0 threshold number 1 covariance heritability 0.6"

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## [1] "Set threshold 10 and prevalence 0.274"
## [1] "Running for rep 9 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 7.000000000000001 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 3.200000000000002 and prevalence 0.253"
## [1] "Running for rep 9 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -0.0999999999999812 and prevalence 0.251"
## [1] "Running for rep 9 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.281"
## [1] "Running for rep 9 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 6.900000000000001 and prevalence 0.25"
## [1] "Running for rep 9 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 4.200000000000002 and prevalence 0.25"
## [1] "Running for rep 9 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -0.199999999999981 and prevalence 0.25"
## [1] "Running for rep 9 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 10 and prevalence 0.26"
## [1] "Running for rep 9 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 6.300000000000001 and prevalence 0.253"
## [1] "Running for rep 9 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 3.000000000000002 and prevalence 0.253"
## [1] "Running for rep 9 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold -0.599999999999981 and prevalence 0.252"
## [1] 10
## [1] "Running for rep 10 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 10 and prevalence 0.262"
## [1] "Running for rep 10 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 6.900000000000001 and prevalence 0.253"
## [1] "Running for rep 10 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold 3.700000000000002 and prevalence 0.252"
## [1] "Running for rep 10 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold 0.2000000000000019 and prevalence 0.25"
## [1] "Running for rep 10 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 10 and prevalence 0.267"
## [1] "Running for rep 10 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 7.000000000000001 and prevalence 0.251"
## [1] "Running for rep 10 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold 3.500000000000002 and prevalence 0.251"
## [1] "Running for rep 10 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -0.499999999999981 and prevalence 0.25"
## [1] "Running for rep 10 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 10 and prevalence 0.29"
## [1] "Running for rep 10 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 6.900000000000001 and prevalence 0.25"
## [1] "Running for rep 10 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold 3.300000000000002 and prevalence 0.25"
## [1] "Running for rep 10 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold 0.2000000000000019 and prevalence 0.251"
## [1] "Running for rep 10 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 9.8 and prevalence 0.254"
## [1] "Running for rep 10 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 6.900000000000001 and prevalence 0.25"
## [1] "Running for rep 10 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold 4.100000000000002 and prevalence 0.251"

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## [1] "Running for rep 10 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold 0.400000000000019 and prevalence 0.25"
## [1] "Running for rep 10 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 10 and prevalence 0.264"
## [1] "Running for rep 10 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 6.800000000000001 and prevalence 0.252"
## [1] "Running for rep 10 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold 3.600000000000002 and prevalence 0.251"
## [1] "Running for rep 10 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -0.0999999999999812 and prevalence 0.255"
## [1] "Running for rep 10 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 10 and prevalence 0.258"
## [1] "Running for rep 10 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 7.500000000000001 and prevalence 0.252"
## [1] "Running for rep 10 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold 3.200000000000002 and prevalence 0.251"
## [1] "Running for rep 10 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold 0.200000000000019 and prevalence 0.25"

```

rows_hercov

| ## | h2_symptoms | h2_disease | sig2g | sig2e | prev | rep | P | c |
|-------|-------------|---------------|---------------|-----------|------|-----|---|---------------|
| ## 1 | 0 | 0.0578648535 | 6.481761e-02 | 1.0553374 | 268 | 1 | 5 | 1.000000e+01 |
| ## 2 | 0 | -0.1078708480 | -9.605273e-02 | 0.9864947 | 252 | 1 | 5 | 7.000000e+00 |
| ## 3 | 0 | 0.0091496232 | 1.044468e-02 | 1.1310978 | 254 | 1 | 5 | 3.400000e+00 |
| ## 4 | 0 | 0.0754992754 | 8.910021e-02 | 1.0910463 | 253 | 1 | 5 | 4.000000e-01 |
| ## 5 | 0 | 0.5547256128 | 5.344356e-01 | 0.4289878 | 265 | 1 | 5 | 1.000000e+01 |
| ## 6 | 0 | -0.2020433863 | -1.792354e-01 | 1.0663487 | 250 | 1 | 5 | 6.700000e+00 |
| ## 7 | 0 | -0.0506269525 | -5.044709e-02 | 1.0468944 | 252 | 1 | 5 | 4.100000e+00 |
| ## 8 | 0 | 0.1198846423 | 1.368115e-01 | 1.0043814 | 250 | 1 | 5 | -3.000000e-01 |
| ## 9 | 0 | 0.1080815815 | 1.032447e-01 | 0.8520034 | 258 | 1 | 5 | 9.300000e+00 |
| ## 10 | 0 | -0.2129673281 | -2.261932e-01 | 1.2882963 | 250 | 1 | 5 | 7.700000e+00 |
| ## 11 | 0 | 0.1288487669 | 1.073611e-01 | 0.7258726 | 251 | 1 | 5 | 3.200000e+00 |
| ## 12 | 0 | -0.0406094654 | -3.937542e-02 | 1.0089874 | 250 | 1 | 5 | -2.000000e-01 |
| ## 13 | 0 | -0.0475308374 | -4.452596e-02 | 0.9813065 | 278 | 1 | 5 | 1.000000e+01 |
| ## 14 | 0 | -0.0783559009 | -6.957010e-02 | 0.9574433 | 251 | 1 | 5 | 7.600000e+00 |
| ## 15 | 0 | 0.0206363460 | 1.834398e-02 | 0.8705719 | 251 | 1 | 5 | 4.300000e+00 |
| ## 16 | 0 | 0.1707972800 | 1.688735e-01 | 0.8198628 | 251 | 1 | 5 | 5.000000e-01 |
| ## 17 | 0 | 0.3090338087 | 2.948571e-01 | 0.6592686 | 252 | 1 | 5 | 1.000000e+01 |
| ## 18 | 0 | 0.2833077397 | 3.002999e-01 | 0.7596780 | 253 | 1 | 5 | 7.900000e+00 |
| ## 19 | 0 | -0.3020980050 | -2.737455e-01 | 1.1798937 | 256 | 1 | 5 | 3.100000e+00 |
| ## 20 | 0 | 0.0281557639 | 2.282387e-02 | 0.7878050 | 252 | 1 | 5 | -6.000000e-01 |
| ## 21 | 0 | -0.2372530232 | -2.231701e-01 | 1.1638120 | 251 | 1 | 5 | 9.800000e+00 |
| ## 22 | 0 | -0.1602501746 | -1.722338e-01 | 1.2470149 | 250 | 1 | 5 | 6.900000e+00 |
| ## 23 | 0 | 0.2161922854 | 2.483881e-01 | 0.9005339 | 254 | 1 | 5 | 3.800000e+00 |
| ## 24 | 0 | 0.0089562230 | 8.465545e-03 | 0.9367482 | 253 | 1 | 5 | 1.879052e-14 |
| ## 25 | 0 | -0.0900232098 | -9.328130e-02 | 1.1294729 | 273 | 2 | 5 | 1.000000e+01 |
| ## 26 | 0 | -0.4986828059 | -4.832593e-01 | 1.4523308 | 250 | 2 | 5 | 7.000000e+00 |
| ## 27 | 0 | 0.6341315562 | 5.587774e-01 | 0.3223921 | 252 | 2 | 5 | 4.200000e+00 |
| ## 28 | 0 | -0.0869374823 | -9.338027e-02 | 1.1674885 | 253 | 2 | 5 | -7.000000e-01 |
| ## 29 | 0 | -0.1936828279 | -2.073868e-01 | 1.2781412 | 256 | 2 | 5 | 1.000000e+01 |
| ## 30 | 0 | 0.3007318162 | 2.781451e-01 | 0.6467490 | 252 | 2 | 5 | 6.300000e+00 |
| ## 31 | 0 | 0.1221505869 | 1.151084e-01 | 0.8272396 | 250 | 2 | 5 | 4.100000e+00 |
| ## 32 | 0 | -0.1020967954 | -8.366552e-02 | 0.9031380 | 252 | 2 | 5 | -4.000000e-01 |

| | | | | | | | |
|-------|---|---------------|---------------|-----------|-----|-----|---------------|
| ## 33 | 0 | 0.0808019105 | 8.983949e-02 | 1.0220091 | 270 | 2 5 | 1.000000e+01 |
| ## 34 | 0 | -0.2389473021 | -2.542733e-01 | 1.3184131 | 252 | 2 5 | 6.800000e+00 |
| ## 35 | 0 | 0.0064607320 | 6.218874e-03 | 0.9563460 | 250 | 2 5 | 4.400000e+00 |
| ## 36 | 0 | 0.1012410350 | 1.122901e-01 | 0.9968463 | 250 | 2 5 | -7.000000e-01 |
| ## 37 | 0 | 0.2706036623 | 2.568100e-01 | 0.6922163 | 265 | 2 5 | 1.000000e+01 |
| ## 38 | 0 | 0.1578248160 | 1.489027e-01 | 0.7945655 | 253 | 2 5 | 7.000000e+00 |
| ## 39 | 0 | 0.0046337896 | 4.820421e-03 | 1.0354558 | 254 | 2 5 | 3.900000e+00 |
| ## 40 | 0 | -0.0979435399 | -8.735865e-02 | 0.9792873 | 253 | 2 5 | -5.000000e-01 |
| ## 41 | 0 | 0.0264880353 | 2.571876e-02 | 0.9452390 | 274 | 2 5 | 1.000000e+01 |
| ## 42 | 0 | -0.2898385866 | -2.883946e-01 | 1.2834126 | 253 | 2 5 | 7.600000e+00 |
| ## 43 | 0 | -0.2109031477 | -1.978492e-01 | 1.1359537 | 254 | 2 5 | 3.700000e+00 |
| ## 44 | 0 | -0.2531077901 | -2.913431e-01 | 1.4424065 | 253 | 2 5 | -2.000000e-01 |
| ## 45 | 0 | -0.1895193283 | -2.184304e-01 | 1.3709796 | 251 | 2 5 | 9.900000e+00 |
| ## 46 | 0 | 0.2573738416 | 2.376186e-01 | 0.6856244 | 254 | 2 5 | 6.900000e+00 |
| ## 47 | 0 | -0.3497448734 | -3.613343e-01 | 1.3944712 | 250 | 2 5 | 3.400000e+00 |
| ## 48 | 0 | -0.0970537744 | -9.873827e-02 | 1.1160946 | 252 | 2 5 | -6.000000e-01 |
| ## 49 | 0 | 0.0357011083 | 3.151113e-02 | 0.8511262 | 270 | 3 5 | 1.000000e+01 |
| ## 50 | 0 | -0.0764364091 | -7.295629e-02 | 1.0274266 | 250 | 3 5 | 7.300000e+00 |
| ## 51 | 0 | -0.0622833360 | -5.300858e-02 | 0.9040963 | 250 | 3 5 | 3.700000e+00 |
| ## 52 | 0 | 0.0462338221 | 4.185377e-02 | 0.8634092 | 250 | 3 5 | -3.000000e-01 |
| ## 53 | 0 | 0.0216731456 | 2.185065e-02 | 0.9863394 | 250 | 3 5 | 9.900000e+00 |
| ## 54 | 0 | 0.2664103898 | 2.770749e-01 | 0.7629556 | 250 | 3 5 | 6.900000e+00 |
| ## 55 | 0 | 0.1406920850 | 1.345261e-01 | 0.8216476 | 254 | 3 5 | 3.800000e+00 |
| ## 56 | 0 | -0.2259659957 | -2.277180e-01 | 1.2354715 | 251 | 3 5 | 3.000000e-01 |
| ## 57 | 0 | 0.2176063212 | 2.322181e-01 | 0.8349296 | 272 | 3 5 | 1.000000e+01 |
| ## 58 | 0 | 0.2578572584 | 2.684409e-01 | 0.7726036 | 250 | 3 5 | 6.900000e+00 |
| ## 59 | 0 | -0.2892513290 | -2.915403e-01 | 1.2994537 | 251 | 3 5 | 3.800000e+00 |
| ## 60 | 0 | 0.0971620229 | 8.811276e-02 | 0.8187515 | 250 | 3 5 | 2.000000e-01 |
| ## 61 | 0 | -0.2416665259 | -2.692578e-01 | 1.3834285 | 268 | 3 5 | 1.000000e+01 |
| ## 62 | 0 | -0.2660199103 | -2.716947e-01 | 1.2930267 | 251 | 3 5 | 8.000000e+00 |
| ## 63 | 0 | -0.3115811420 | -3.360892e-01 | 1.4147462 | 251 | 3 5 | 3.700000e+00 |
| ## 64 | 0 | 0.1888799739 | 1.897732e-01 | 0.8149557 | 250 | 3 5 | -4.000000e-01 |
| ## 65 | 0 | 0.1656015628 | 1.826773e-01 | 0.9204362 | 270 | 3 5 | 1.000000e+01 |
| ## 66 | 0 | -0.0818819701 | -7.593781e-02 | 1.0033436 | 254 | 3 5 | 6.800000e+00 |
| ## 67 | 0 | -0.0833194563 | -9.156625e-02 | 1.1905442 | 251 | 3 5 | 3.600000e+00 |
| ## 68 | 0 | -0.2743811125 | -2.456445e-01 | 1.1409119 | 251 | 3 5 | 1.000000e-01 |
| ## 69 | 0 | -0.2878423368 | -2.906974e-01 | 1.3006163 | 250 | 3 5 | 9.300000e+00 |
| ## 70 | 0 | -0.3308410304 | -3.514731e-01 | 1.4138354 | 252 | 3 5 | 7.200000e+00 |
| ## 71 | 0 | 0.4730443261 | 5.024879e-01 | 0.5597549 | 250 | 3 5 | 3.500000e+00 |
| ## 72 | 0 | 0.3205164326 | 2.900506e-01 | 0.6148971 | 255 | 3 5 | 2.000000e-01 |
| ## 73 | 0 | 0.1313752126 | 1.272066e-01 | 0.8410625 | 252 | 4 5 | 9.500000e+00 |
| ## 74 | 0 | -0.3786924691 | -3.353996e-01 | 1.2210778 | 250 | 4 5 | 8.000000e+00 |
| ## 75 | 0 | 0.1460567357 | 1.340584e-01 | 0.7837930 | 252 | 4 5 | 4.500000e+00 |
| ## 76 | 0 | 0.3139408824 | 3.350024e-01 | 0.7320852 | 250 | 4 5 | -3.000000e-01 |
| ## 77 | 0 | -0.0246506052 | -2.278967e-02 | 0.9472974 | 266 | 4 5 | 1.000000e+01 |
| ## 78 | 0 | -0.1195850827 | -1.091558e-01 | 1.0219439 | 252 | 4 5 | 7.000000e+00 |
| ## 79 | 0 | -0.1513216261 | -1.600927e-01 | 1.2180560 | 253 | 4 5 | 3.700000e+00 |
| ## 80 | 0 | -0.3299783664 | -3.158465e-01 | 1.2730199 | 255 | 4 5 | -5.000000e-01 |
| ## 81 | 0 | 0.3408166322 | 2.951231e-01 | 0.5708061 | 271 | 4 5 | 1.000000e+01 |
| ## 82 | 0 | 0.2109018361 | 1.696830e-01 | 0.6348763 | 250 | 4 5 | 7.900000e+00 |
| ## 83 | 0 | -0.6471449637 | -7.220448e-01 | 1.8377836 | 250 | 4 5 | 3.800000e+00 |
| ## 84 | 0 | 0.0397222181 | 4.130186e-02 | 0.9984653 | 253 | 4 5 | -3.000000e-01 |
| ## 85 | 0 | -0.1764333864 | -1.803937e-01 | 1.2028400 | 289 | 4 5 | 1.000000e+01 |
| ## 86 | 0 | 0.1455257662 | 1.576799e-01 | 0.9258388 | 250 | 4 5 | 6.400000e+00 |

| | | | | | | | | |
|--------|---|---------------|---------------|-----------|-----|---|---|---------------|
| ## 87 | 0 | -0.1982503755 | -2.081219e-01 | 1.2579150 | 253 | 4 | 5 | 3.700000e+00 |
| ## 88 | 0 | 0.2628617314 | 2.801937e-01 | 0.7857421 | 253 | 4 | 5 | -6.000000e-01 |
| ## 89 | 0 | 0.1090416689 | 9.989906e-02 | 0.8162558 | 294 | 4 | 5 | 1.000000e+01 |
| ## 90 | 0 | 0.2499626063 | 2.133122e-01 | 0.6400642 | 251 | 4 | 5 | 7.500000e+00 |
| ## 91 | 0 | 0.1963346620 | 1.837328e-01 | 0.7520817 | 251 | 4 | 5 | 4.000000e+00 |
| ## 92 | 0 | 0.0542326085 | 5.575545e-02 | 0.9723244 | 254 | 4 | 5 | -7.000000e-01 |
| ## 93 | 0 | 0.2331078105 | 2.151331e-01 | 0.7077580 | 274 | 4 | 5 | 1.000000e+01 |
| ## 94 | 0 | -0.0594136381 | -6.363876e-02 | 1.1347524 | 250 | 4 | 5 | 7.200000e+00 |
| ## 95 | 0 | 0.0811157766 | 7.425656e-02 | 0.8411826 | 252 | 4 | 5 | 3.200000e+00 |
| ## 96 | 0 | -0.4169460852 | -3.738424e-01 | 1.2704629 | 253 | 4 | 5 | -1.000000e-01 |
| ## 97 | 0 | -0.0646207373 | -6.472024e-02 | 1.0662600 | 269 | 5 | 5 | 1.000000e+01 |
| ## 98 | 0 | 0.0072772979 | 7.203249e-03 | 0.9826215 | 250 | 5 | 5 | 7.800000e+00 |
| ## 99 | 0 | -0.1587517481 | -1.751651e-01 | 1.2785554 | 251 | 5 | 5 | 3.300000e+00 |
| ## 100 | 0 | -0.0961413238 | -1.045355e-01 | 1.1918463 | 251 | 5 | 5 | -5.000000e-01 |
| ## 101 | 0 | 0.0947472381 | 1.193173e-01 | 1.1400053 | 252 | 5 | 5 | 1.000000e+01 |
| ## 102 | 0 | -0.1449778251 | -1.489159e-01 | 1.1760793 | 250 | 5 | 5 | 6.900000e+00 |
| ## 103 | 0 | -0.3387250828 | -3.236091e-01 | 1.2789831 | 251 | 5 | 5 | 2.900000e+00 |
| ## 104 | 0 | -0.2797253106 | -2.629502e-01 | 1.2029802 | 250 | 5 | 5 | -3.000000e-01 |
| ## 105 | 0 | -0.1063212994 | -9.785430e-02 | 1.0182183 | 250 | 5 | 5 | 9.700000e+00 |
| ## 106 | 0 | -0.0280947056 | -2.568843e-02 | 0.9400397 | 253 | 5 | 5 | 7.300000e+00 |
| ## 107 | 0 | 0.1389404379 | 1.315167e-01 | 0.8150524 | 252 | 5 | 5 | 4.600000e+00 |
| ## 108 | 0 | -0.0602133163 | -6.867087e-02 | 1.2091307 | 253 | 5 | 5 | 2.000000e-01 |
| ## 109 | 0 | -0.1436204926 | -1.496938e-01 | 1.1919809 | 250 | 5 | 5 | 1.000000e+01 |
| ## 110 | 0 | 0.0437119738 | 4.750255e-02 | 1.0392145 | 253 | 5 | 5 | 6.700000e+00 |
| ## 111 | 0 | -0.0209041583 | -2.057476e-02 | 1.0048170 | 254 | 5 | 5 | 4.400000e+00 |
| ## 112 | 0 | 0.3930755785 | 3.489660e-01 | 0.5388175 | 251 | 5 | 5 | -1.000000e-01 |
| ## 113 | 0 | -0.7785663616 | -8.166267e-01 | 1.8655118 | 253 | 5 | 5 | 9.800000e+00 |
| ## 114 | 0 | -0.4917778846 | -4.397304e-01 | 1.3338949 | 255 | 5 | 5 | 7.400000e+00 |
| ## 115 | 0 | 0.0635358587 | 6.822145e-02 | 1.0055258 | 251 | 5 | 5 | 4.000000e+00 |
| ## 116 | 0 | -0.3315315878 | -2.670187e-01 | 1.0724283 | 254 | 5 | 5 | -1.000000e-01 |
| ## 117 | 0 | 0.2721526836 | 2.738015e-01 | 0.7322570 | 262 | 5 | 5 | 1.000000e+01 |
| ## 118 | 0 | -0.0200824619 | -1.823943e-02 | 0.9264661 | 252 | 5 | 5 | 7.900000e+00 |
| ## 119 | 0 | -0.1705692294 | -1.397404e-01 | 0.9589998 | 252 | 5 | 5 | 3.000000e+00 |
| ## 120 | 0 | 0.0861046416 | 9.432286e-02 | 1.0011217 | 253 | 5 | 5 | -9.000000e-01 |
| ## 121 | 0 | 0.1457905257 | 1.383976e-01 | 0.8108931 | 259 | 6 | 5 | 1.000000e+01 |
| ## 122 | 0 | -0.2530995893 | -2.609727e-01 | 1.2920794 | 250 | 6 | 5 | 6.700000e+00 |
| ## 123 | 0 | 0.2494797268 | 2.686453e-01 | 0.8081768 | 251 | 6 | 5 | 3.800000e+00 |
| ## 124 | 0 | 0.2491462681 | 2.744448e-01 | 0.8270961 | 251 | 6 | 5 | -2.000000e-01 |
| ## 125 | 0 | 0.2193516397 | 2.458067e-01 | 0.8747992 | 251 | 6 | 5 | 1.000000e+01 |
| ## 126 | 0 | -0.3151140685 | -3.203845e-01 | 1.3371098 | 256 | 6 | 5 | 7.300000e+00 |
| ## 127 | 0 | -0.0253263523 | -2.336042e-02 | 0.9457364 | 252 | 6 | 5 | 3.900000e+00 |
| ## 128 | 0 | 0.0419508576 | 4.017245e-02 | 0.9174349 | 254 | 6 | 5 | -5.000000e-01 |
| ## 129 | 0 | 0.3778507585 | 3.299265e-01 | 0.5432397 | 268 | 6 | 5 | 1.000000e+01 |
| ## 130 | 0 | 0.1842483578 | 1.916908e-01 | 0.8487027 | 254 | 6 | 5 | 7.600000e+00 |
| ## 131 | 0 | 0.0620707531 | 5.689839e-02 | 0.8597714 | 256 | 6 | 5 | 3.300000e+00 |
| ## 132 | 0 | -0.0088165897 | -8.578883e-03 | 0.9816175 | 252 | 6 | 5 | 3.000000e-01 |
| ## 133 | 0 | -0.2758360401 | -2.724917e-01 | 1.2603675 | 254 | 6 | 5 | 1.000000e+01 |
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| ## 135 | 0 | -0.1827322600 | -1.715540e-01 | 1.1103808 | 254 | 6 | 5 | 3.900000e+00 |
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| ## 137 | 0 | -0.0210191475 | -2.067730e-02 | 1.0044138 | 285 | 6 | 5 | 1.000000e+01 |
| ## 138 | 0 | -0.2768767167 | -2.799667e-01 | 1.2911266 | 255 | 6 | 5 | 7.800000e+00 |
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| ## 140 | 0 | 0.1357179234 | 1.127202e-01 | 0.7178271 | 251 | 6 | 5 | 1.879052e-14 |

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|--------|---|---------------|---------------|-----------|-----|-----|---------------|
| ## 141 | 0 | 0.1195722484 | 1.352546e-01 | 0.9958991 | 276 | 6 5 | 1.000000e+01 |
| ## 142 | 0 | 0.3748615042 | 3.791722e-01 | 0.6323272 | 252 | 6 5 | 6.700000e+00 |
| ## 143 | 0 | -0.0721733253 | -6.694368e-02 | 0.9944841 | 251 | 6 5 | 3.400000e+00 |
| ## 144 | 0 | 0.1934481874 | 1.947908e-01 | 0.8121496 | 253 | 6 5 | 1.879052e-14 |
| ## 145 | 0 | -0.0928295989 | -1.050986e-01 | 1.2372652 | 252 | 7 5 | 1.000000e+01 |
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| ## 147 | 0 | 0.0443419520 | 3.787845e-02 | 0.8163566 | 251 | 7 5 | 3.100000e+00 |
| ## 148 | 0 | 0.2724512158 | 2.606885e-01 | 0.6961379 | 254 | 7 5 | -2.000000e-01 |
| ## 149 | 0 | -0.0846205430 | -9.836908e-02 | 1.2608419 | 264 | 7 5 | 1.000000e+01 |
| ## 150 | 0 | -0.1605098612 | -1.374363e-01 | 0.9936849 | 252 | 7 5 | 6.700000e+00 |
| ## 151 | 0 | 0.5226927079 | 5.062345e-01 | 0.4622782 | 251 | 7 5 | 4.200000e+00 |
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| ## 167 | 0 | -0.0432656804 | -4.099924e-02 | 0.9886149 | 253 | 7 5 | 4.900000e+00 |
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| ## 172 | 0 | 0.0355531674 | 2.788304e-02 | 0.7563802 | 253 | 8 5 | 1.879052e-14 |
| ## 173 | 0 | -0.0661060987 | -5.963829e-02 | 0.9617985 | 253 | 8 5 | 9.800000e+00 |
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## 197      0 -0.0086119787 -9.055058e-03  1.0605042  250    9  5  9.900000e+00
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## 199      0  0.1210647156  1.086911e-01  0.7891026  252    9  5  3.400000e+00
## 200      0 -0.0575727863 -5.867362e-02  1.0777943  252    9  5  1.879052e-14
## 201      0 -0.4065660091 -4.214694e-01  1.4581262  254    9  5  1.000000e+01
## 202      0  0.0959726087  9.712541e-02  0.9148863  252    9  5  6.400000e+00
## 203      0  0.0001007919  8.824702e-05  0.8754483  251    9  5  3.600000e+00
## 204      0  0.1940602483  1.992589e-01  0.8275299  253    9  5 -5.000000e-01
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## 210      0 -0.4745529978 -4.928408e-01  1.5313777  250    9  5  6.900000e+00
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## 222      0 -0.2923147027 -2.703096e-01  1.1950310  251   10  5  7.000000e+00
## 223      0  0.0548574341  5.046083e-02  0.8693932  251   10  5  3.500000e+00
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## 225      0 -0.4072545481 -3.771333e-01  1.3031716  290   10  5  1.000000e+01
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## 5      1      0.2
## 6      2      0.2
## 7      3      0.2

```

| | | | |
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| ## | 30 | 2 | 0.2 |
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| ## | 32 | 4 | 0.2 |
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| ## | 38 | 2 | 0.6 |
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| ## | 42 | 2 | 0.8 |
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| ## | 46 | 2 | 1.0 |
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| ## | 51 | 3 | 0.0 |
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| ## | 53 | 1 | 0.2 |
| ## | 54 | 2 | 0.2 |
| ## | 55 | 3 | 0.2 |
| ## | 56 | 4 | 0.2 |
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| ## | 58 | 2 | 0.4 |
| ## | 59 | 3 | 0.4 |
| ## | 60 | 4 | 0.4 |
| ## | 61 | 1 | 0.6 |

| | | | |
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| ## | 63 | 3 | 0.6 |
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| ## | 66 | 2 | 0.8 |
| ## | 67 | 3 | 0.8 |
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| ## | 111 | 3 | 0.6 |
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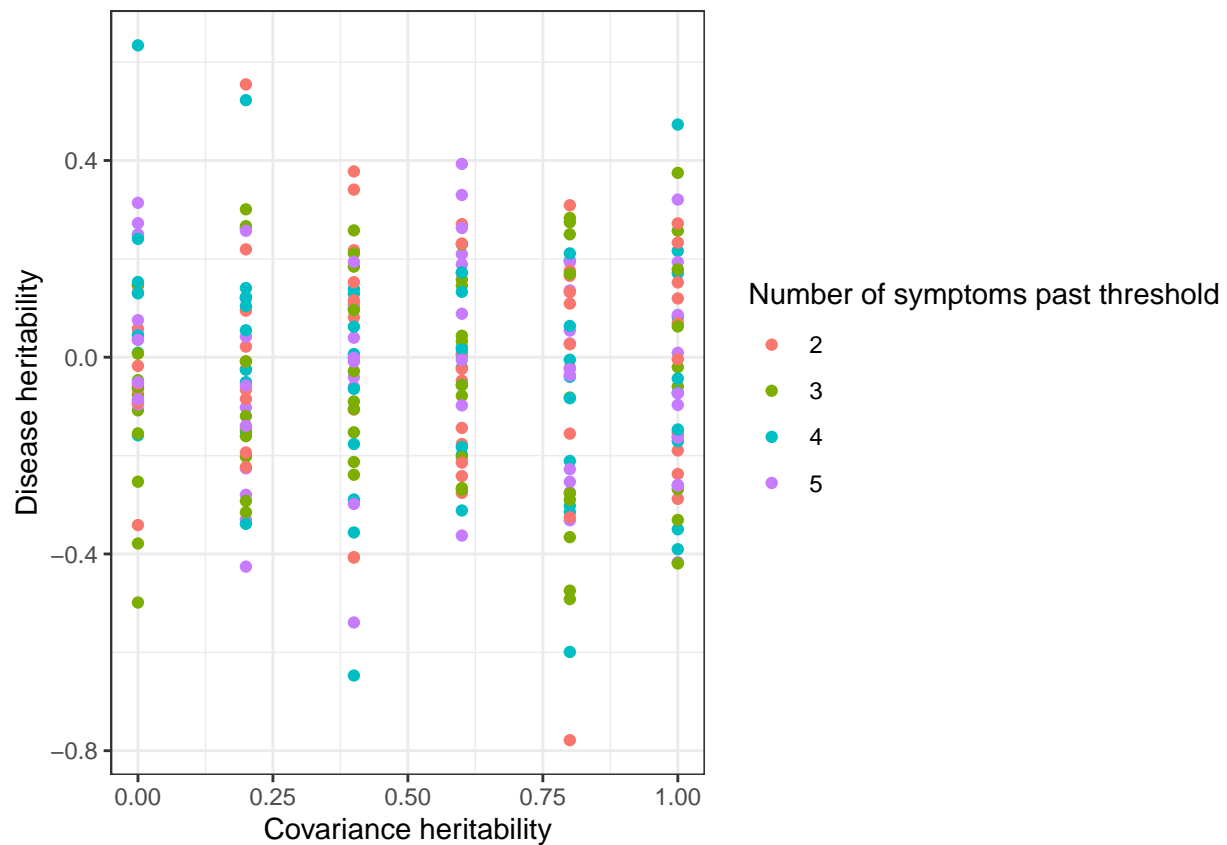
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| ## | 148 | 4 | 0.0 |
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| ## | 162 | 2 | 0.8 |
| ## | 163 | 3 | 0.8 |
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| ## | 165 | 1 | 1.0 |
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| ## | 223 | 3 | 0.2 |

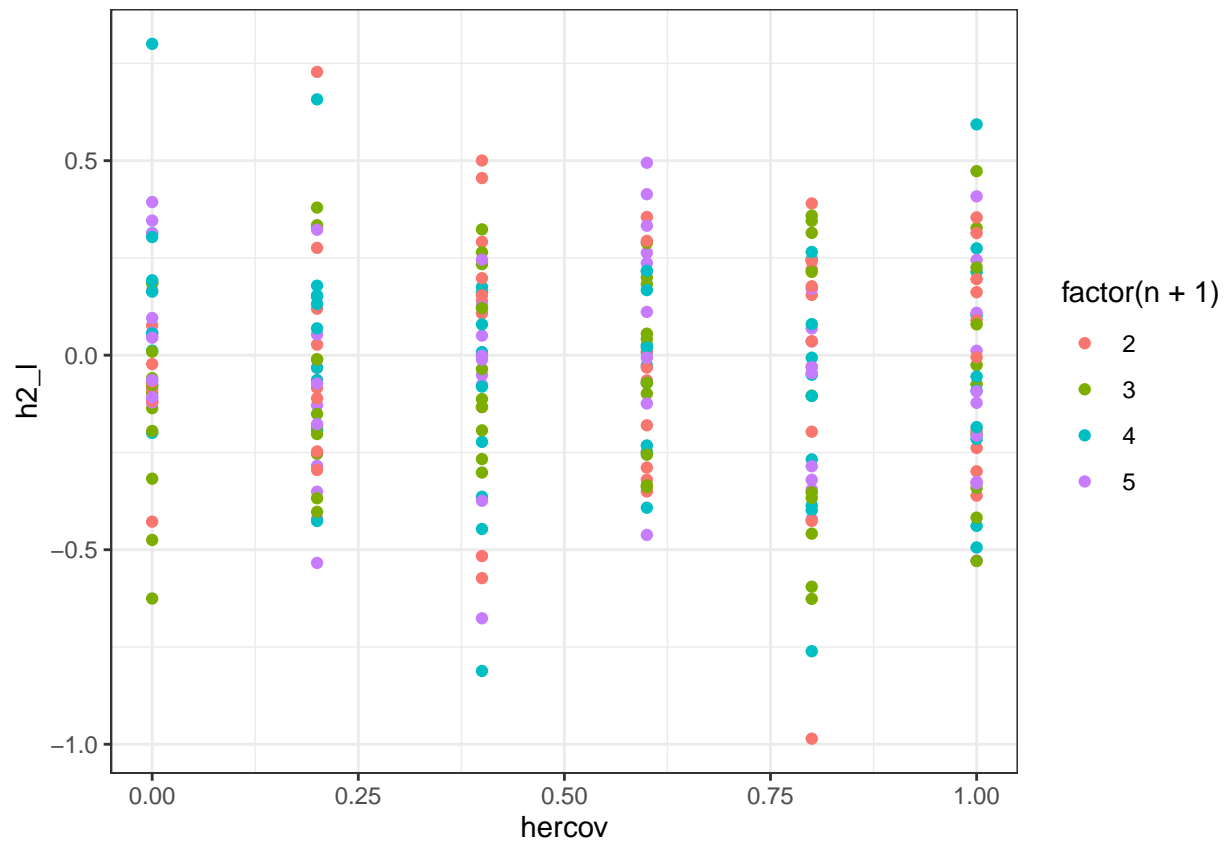
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## 226 2    0.4
## 227 3    0.4
## 228 4    0.4
## 229 1    0.6
## 230 2    0.6
## 231 3    0.6
## 232 4    0.6
## 233 1    0.8
## 234 2    0.8
## 235 3    0.8
## 236 4    0.8
## 237 1    1.0
## 238 2    1.0
## 239 3    1.0
## 240 4    1.0
```

```
rows_hercov <- rows_hercov %>% mutate(h2_l = h2_disease * (prev/N) * (1-prev/N) / dnorm(prev/N)^2)
```

```
ggplot(rows_hercov,aes(x=hercov,y=h2_disease)) +
  geom_point(aes(col=factor(n+1))) +
  #geom_point(aes(y=h2_l,col="expected h2_l (one symptom)")) +
  labs(x="Covariance heritability",
       col="Number of symptoms past threshold",
       y="Disease heritability")
```




```
ggplot(rows_hercov,aes(x=hercov,y=h2_l)) +
  geom_point(aes(col=factor(n+1)))
```



GWAS on individual-level products

```
N <- 5000
l <- 200
G <- simulate_genotypes(N = N,L = l)
G <- scale(G)
p <- 5
hercov <- .9
her <- .1
L <- matrix(0,nrow=p,ncol=p)
L[lower.tri(L,diag=T)] <- 1
diag(L) <- 1

beta_cov <- matrix(mvrnorm(n=l,mu = rep(0,p),Sigma = diag(p)),nrow=1) %*% diag(3,p,p) * sqrt(hercov / 1)
e_cov <- matrix(mvrnorm(n=N,mu = rep(0,p),Sigma = diag(p)),nrow=N) %*% diag(3,p,p) * sqrt(1-hercov)
D_vectors <- G %*% beta_cov + e_cov + matrix(10,nrow=N,ncol=p)
D_vectors[D_vectors<0] <- 0.1

beta <- matrix(mvrnorm(n=l,mu = rep(0,p),Sigma = diag(5,p,p)),nrow=1) %*% diag(1,p,p) * sqrt(her / 1)
```

```

e <- matrix(mvrnorm(n=N,mu = rep(0,p),Sigma = diag(5,p,p)),nrow=N) * sqrt(1-her)

X <- matrix(0,nrow=N,ncol=p)
# Give each person a covariance matrix and draw symptoms
for (ind in c(1:N)){
  # make into matrix
  Sig_ind <- L %*% diag(D_vectors[ind,]) %*% t(L)
  beta_transformed <- t(chol(Sig_ind)) %*% t(beta) %>% t() # check this
  e_transformed <- t(chol(Sig_ind)) %*% e[ind,] %>% t() # check this
  X[ind,] <- G[ind,] %*% beta_transformed + e_transformed
}

# setting the threshold to keep constant prevalence
c <- 1
n <- 3
Y <- apply(X,1,mdd_risk,threshold=c,n=n)
prev <- sum(Y)/N

```

```
lm(X.1 * X.2 ~ D.1 + D.2 + D.3, data= data.frame("X"=X,"D"=D_vectors)) %>% summary()
```

```

##
## Call:
## lm(formula = X.1 * X.2 ~ D.1 + D.2 + D.3, data = data.frame(X = X,
##   D = D_vectors))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -206.72  -50.21  -25.58   20.96  778.56
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.48765     7.58923  -0.064   0.949
## D.1           5.25402     0.42035  12.499 <2e-16 ***
## D.2           0.05213     0.42631   0.122   0.903
## D.3          -0.23547     0.42120  -0.559   0.576
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 88.59 on 4996 degrees of freedom
## Multiple R-squared:  0.03057,    Adjusted R-squared:  0.02998
## F-statistic: 52.51 on 3 and 4996 DF,  p-value: < 2.2e-16

```

```
lm(X.1 > c & X.2 > c ~ D.1, data= data.frame("X"=X,"D"=D_vectors)) %>% summary()
```

```

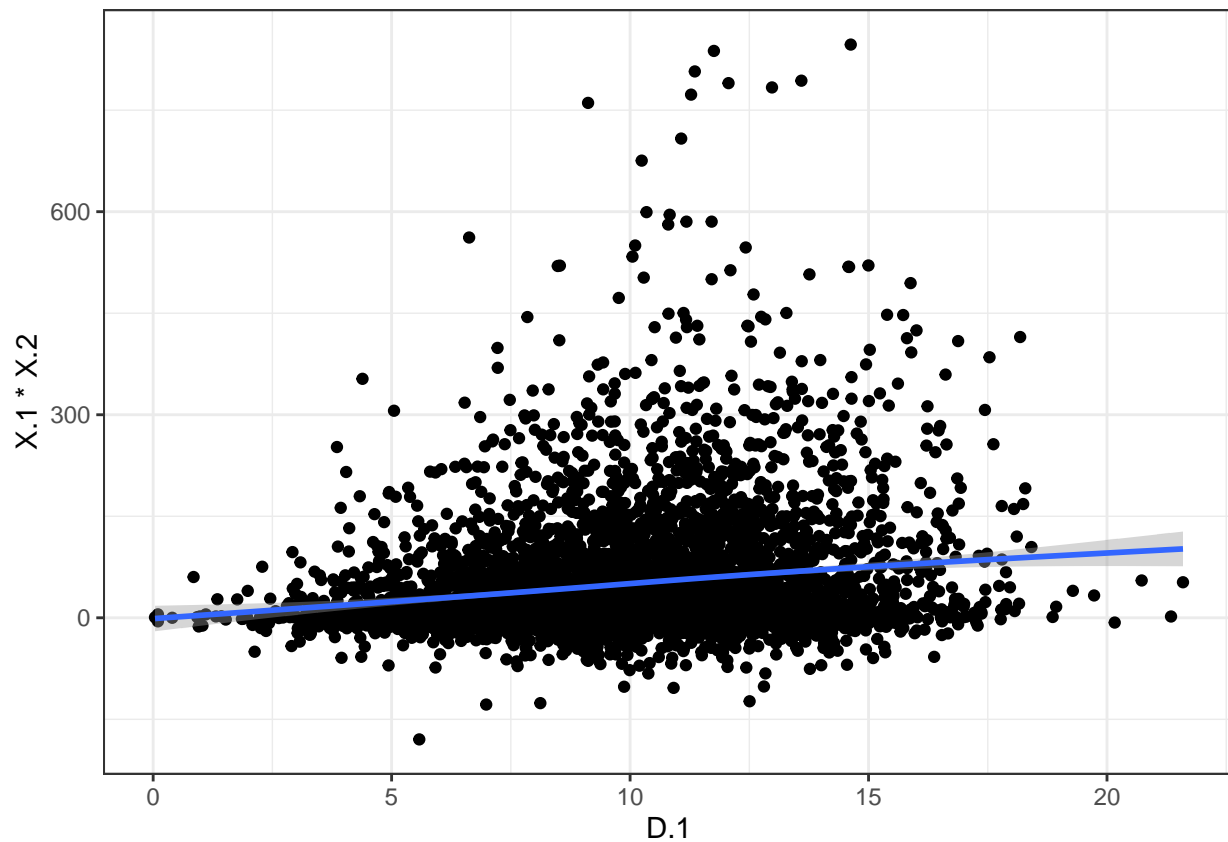
##
## Call:
## lm(formula = X.1 > c & X.2 > c ~ D.1, data = data.frame(X = X,
##   D = D_vectors))
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.4017 -0.3300 -0.3108  0.6605  0.7375

```

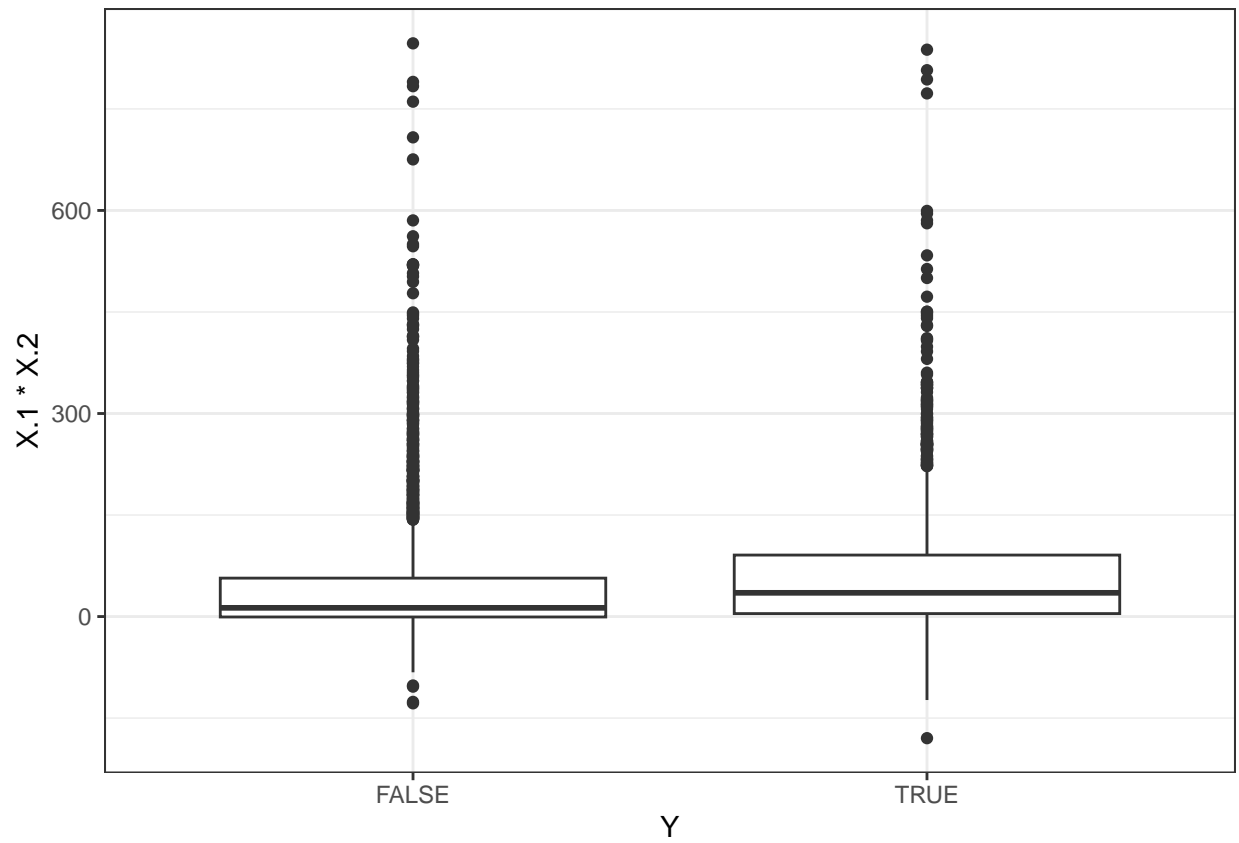
```
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.256844   0.023137  11.101  < 2e-16 ***
## D.1          0.006707   0.002214   3.029  0.00247 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4677 on 4998 degrees of freedom
## Multiple R-squared:  0.001832,    Adjusted R-squared:  0.001632
## F-statistic: 9.174 on 1 and 4998 DF,  p-value: 0.002467
```

```
data.frame("X"=X,"D"=D_vectors,"Y"=Y) %>%
ggplot(aes(y=X.1*X.2,x=D.1)) + geom_point() +
  geom_smooth()
```

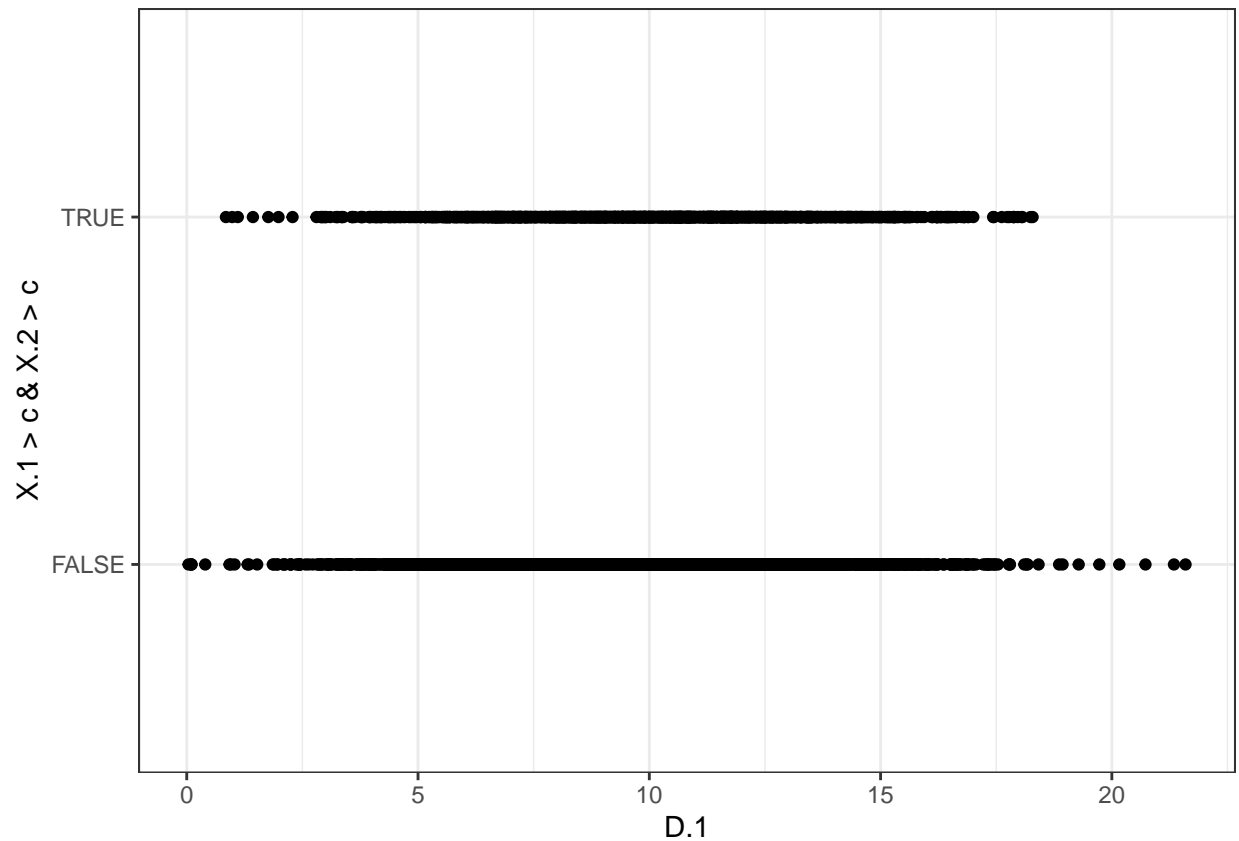
```
## 'geom_smooth()' using method = 'gam' and formula = 'y ~ s(x, bs = "cs")'
```



```
data.frame("X"=X,"D"=D_vectors,"Y"=Y) %>%
ggplot(aes(y=X.1*X.2,x=Y)) + geom_boxplot()
```



```
data.frame("X"=X, "D"=D_vectors) %>%
  ggplot(aes(y=X.1>c & X.2 > c, x=D.1)) + geom_point()
```



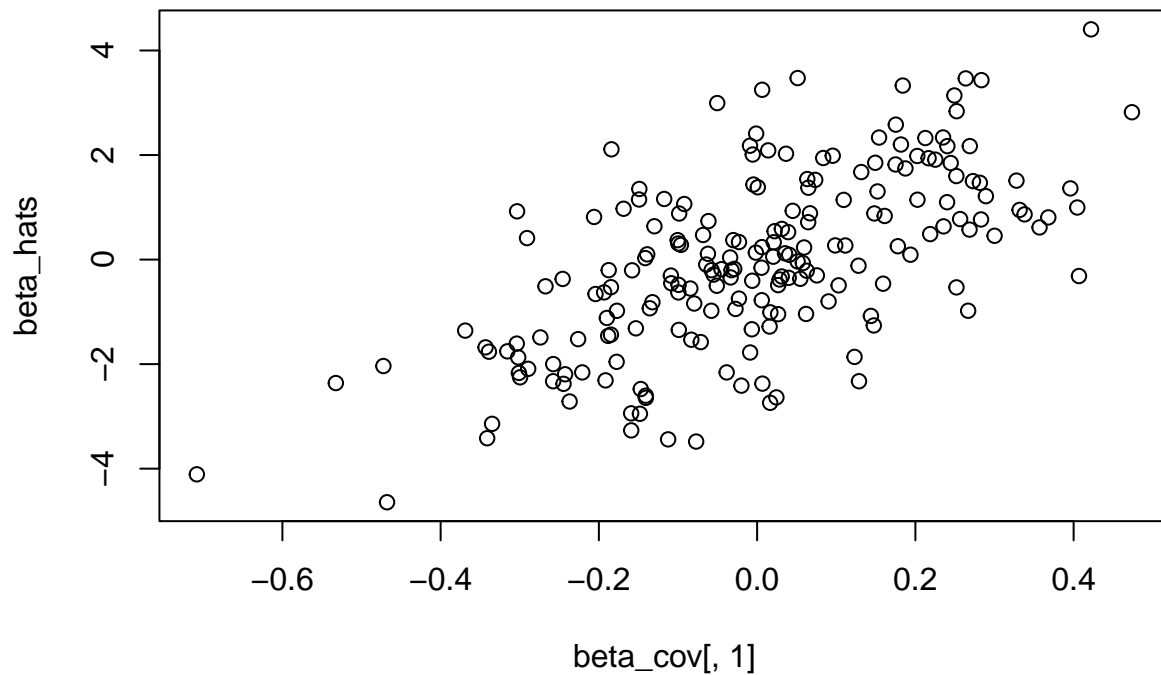
```
data.frame("X"=X,"D"=D_vectors,"Y"=Y) %>% group_by(X.1>c & X.2 > c) %>% summarise(D = mean(D.1),X12 = m
```

```
## # A tibble: 2 x 4
##   'X.1 > c & X.2 > c'      D    X12  Yprv
##   <lg1>                <dbl> <dbl> <dbl>
## 1 FALSE                 9.92  36.7  0.124
## 2 TRUE                 10.2   78.6  0.784
```

```
IP <- X[,1]*X[,2]
```

```
res <- apply(G , 2, function(x) lm(IP ~ x))
p_hats <- sapply(res, function(x) summary(x)$coefficients[2, 4])
beta_hats <- sapply(res, function(x) summary(x)$coefficients[2, 1])
```

```
plot(beta_cov[,1],beta_hats)
```



```
lm(beta_hats ~ beta_cov[,1]) %>% summary()
```

```
##
## Call:
## lm(formula = beta_hats ~ beta_cov[, 1])
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -3.0385 -0.7812 -0.0200  0.8304  3.2944
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.02922    0.09141   -0.32    0.75
## beta_cov[, 1]  5.37735    0.46012   11.69 <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.293 on 198 degrees of freedom
## Multiple R-squared:  0.4082, Adjusted R-squared:  0.4052
## F-statistic: 136.6 on 1 and 198 DF, p-value: < 2.2e-16
```

```
summary(res[[1]])$coefficients[2,1]
```

```
## [1] -0.4612214
```

```
cov(X[,1:5])/5
```

```
##           [,1]      [,2]      [,3]      [,4]      [,5]
## [1,] 10.22947 10.05628 10.18339 10.36997 10.17690
## [2,] 10.05628 20.08430 20.25833 20.52662 20.37557
## [3,] 10.18339 20.25833 30.14918 30.23204 30.17053
## [4,] 10.36997 20.52662 30.23204 40.04177 40.08007
## [5,] 10.17690 20.37557 30.17053 40.08007 50.00763
```

```
colMeans(D_vectors)
```

```
## [1] 10.012735  9.993547  9.998683 10.004960  9.983179
```

```
rows_hercov2 <- data.frame()
reps <- 5
p <- 5
her <- 0
```

```
D <- diag(1,p,p)
L[lower.tri(L,diag=T)] <- 1
```

```
for (r in c(1:reps)){
  print(r)
  for (hercov in seq(0,1,0.2)){
    for (n in c(1:(p-1))){
      print(paste("Running for rep",r, "heritability", her, "threshold number", n, "covariance heritability", hercov))
      G <- simulate_genotypes(N = N,L = 1)
      G <- scale(G)
      K <- G %*% t(G) / 1

      n_l <- (p ^ 2 - p) / 2
      beta_l <- matrix(mvrnorm(n=1,mu = rep(0,n_l),Sigma = diag(n_l)),nrow=1) %*% diag(1,n_l,n_l) * sqrt(hercov)
      e_l <- matrix(mvrnorm(n=N,mu = rep(0,n_l),Sigma = diag(n_l)),nrow=N) * sqrt(1-hercov)
      L_vectors <- G %*% beta_l + e_l
```

```
beta <- matrix(mvrnorm(n=1,mu = rep(0,p),Sigma = D),nrow=1) %*% diag(1,p,p) * sqrt(her / 1)
e <- matrix(mvrnorm(n=N,mu = rep(0,p),Sigma = D),nrow=N) * sqrt(1-her)
```

```
for (ind in c(1:N)){
  # make into matrix
  L_ind <- matrix(0,p,p)
  L_ind[lower.tri(L_ind,diag = F)] <- L_vectors[ind,]
  diag(L_ind) <- rep(1,p)
  Sig_ind <- L_ind %*% D %*% t(L_ind)
  beta_transformed <- beta %*% t(chol(Sig_ind)) # check this
  e_transformed <- e[ind,] %*% t(chol(Sig_ind)) # check this
  X[ind,] <- G[ind,] %*% beta_transformed + e_transformed
}
```

```
c <- 2
```

```

Y <- apply(X,1,mdd_risk,threshold=c,n=n)
prev <- sum(Y)/N

while (prev<0.25){
  c <- c - 0.1
  Y <- apply(X,1,mdd_risk,threshold=c,n=n)
  prev <- sum(Y)/N
}

print(paste("Set threshold",c,"and prevalence",prev))
res <- greml(Y,G)
h2 <- res$h2

rows_hercov2 <- rbind(rows_hercov2,data.frame("h2_symptoms"=her,
                                             "h2_disease"=h2,
                                             "sig2g"=res$sig2g,
                                             "sig2e"=res$sig2e,
                                             "prev"=sum(Y),
                                             "rep"=r,
                                             "P"=p,
                                             "c"=c,
                                             "n"=n,
                                             "hercov"=hercov))
}
}
}

## [1] 1
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 1.3 and prevalence 0.2524"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 0.499999999999999 and prevalence 0.257"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold -0.200000000000001 and prevalence 0.2606"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -1 and prevalence 0.2628"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 1.3 and prevalence 0.257"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 0.499999999999999 and prevalence 0.2628"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold -0.200000000000001 and prevalence 0.265"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -1 and prevalence 0.269"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 1.3 and prevalence 0.2548"
## [1] "Running for rep 1 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 0.499999999999999 and prevalence 0.2562"
## [1] "Running for rep 1 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold -0.200000000000001 and prevalence 0.2692"
## [1] "Running for rep 1 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold -1 and prevalence 0.2638"
## [1] "Running for rep 1 heritability 0 threshold number 1 covariance heritability 0.6"

```


[illegible]

```

## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -1 and prevalence 0.254"
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 1.2 and prevalence 0.2774"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2594"
## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.267"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -1 and prevalence 0.2594"
## [1] "Running for rep 2 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 1.2 and prevalence 0.283"
## [1] "Running for rep 2 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2636"
## [1] "Running for rep 2 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2618"
## [1] "Running for rep 2 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold -1 and prevalence 0.2646"
## [1] 3
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 1.3 and prevalence 0.2558"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 0.3999999999999999 and prevalence 0.2842"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2578"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -1 and prevalence 0.269"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 1.2 and prevalence 0.2824"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2642"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2616"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -1 and prevalence 0.2698"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 1.3 and prevalence 0.2562"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.266"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2714"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold -1 and prevalence 0.26"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 1.2 and prevalence 0.2802"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2566"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2576"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -1 and prevalence 0.2756"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 1.3 and prevalence 0.2544"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 0.8"

```

```

## [1] "Set threshold 0.4999999999999999 and prevalence 0.2646"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2666"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -1 and prevalence 0.277"
## [1] "Running for rep 3 heritability 0 threshold number 1 covariance heritability 1"
## [1] "Set threshold 1.3 and prevalence 0.254"
## [1] "Running for rep 3 heritability 0 threshold number 2 covariance heritability 1"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.269"
## [1] "Running for rep 3 heritability 0 threshold number 3 covariance heritability 1"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2608"
## [1] "Running for rep 3 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold -1 and prevalence 0.2604"
## [1] 4
## [1] "Running for rep 4 heritability 0 threshold number 1 covariance heritability 0"
## [1] "Set threshold 1.3 and prevalence 0.251"
## [1] "Running for rep 4 heritability 0 threshold number 2 covariance heritability 0"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2672"
## [1] "Running for rep 4 heritability 0 threshold number 3 covariance heritability 0"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.265"
## [1] "Running for rep 4 heritability 0 threshold number 4 covariance heritability 0"
## [1] "Set threshold -1 and prevalence 0.2626"
## [1] "Running for rep 4 heritability 0 threshold number 1 covariance heritability 0.2"
## [1] "Set threshold 1.3 and prevalence 0.2538"
## [1] "Running for rep 4 heritability 0 threshold number 2 covariance heritability 0.2"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.262"
## [1] "Running for rep 4 heritability 0 threshold number 3 covariance heritability 0.2"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.251"
## [1] "Running for rep 4 heritability 0 threshold number 4 covariance heritability 0.2"
## [1] "Set threshold -1 and prevalence 0.267"
## [1] "Running for rep 4 heritability 0 threshold number 1 covariance heritability 0.4"
## [1] "Set threshold 1.3 and prevalence 0.254"
## [1] "Running for rep 4 heritability 0 threshold number 2 covariance heritability 0.4"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2644"
## [1] "Running for rep 4 heritability 0 threshold number 3 covariance heritability 0.4"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.269"
## [1] "Running for rep 4 heritability 0 threshold number 4 covariance heritability 0.4"
## [1] "Set threshold -1 and prevalence 0.2712"
## [1] "Running for rep 4 heritability 0 threshold number 1 covariance heritability 0.6"
## [1] "Set threshold 1.2 and prevalence 0.2796"
## [1] "Running for rep 4 heritability 0 threshold number 2 covariance heritability 0.6"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2586"
## [1] "Running for rep 4 heritability 0 threshold number 3 covariance heritability 0.6"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.2728"
## [1] "Running for rep 4 heritability 0 threshold number 4 covariance heritability 0.6"
## [1] "Set threshold -1 and prevalence 0.2726"
## [1] "Running for rep 4 heritability 0 threshold number 1 covariance heritability 0.8"
## [1] "Set threshold 1.2 and prevalence 0.2742"
## [1] "Running for rep 4 heritability 0 threshold number 2 covariance heritability 0.8"
## [1] "Set threshold 0.4999999999999999 and prevalence 0.2598"
## [1] "Running for rep 4 heritability 0 threshold number 3 covariance heritability 0.8"
## [1] "Set threshold -0.2000000000000001 and prevalence 0.267"
## [1] "Running for rep 4 heritability 0 threshold number 4 covariance heritability 0.8"
## [1] "Set threshold -1 and prevalence 0.2668"

```

[illegible]

```
## [1] "Set threshold -0.200000000000001 and prevalence 0.27"
## [1] "Running for rep 5 heritability 0 threshold number 4 covariance heritability 1"
## [1] "Set threshold -1 and prevalence 0.259"
```

```
rows_hercov2
```

| ## | h2_symptoms | h2_disease | sig2g | sig2e | prev | rep | P | c | n |
|-------|-------------|---------------|---------------|-------------|------|-----|---|------|---|
| ## 1 | 0 | 0.0395706999 | 0.0411892043 | 0.99971238 | 1262 | 1 | 5 | 1.3 | 1 |
| ## 2 | 0 | -0.4359135889 | -0.3927284583 | 1.29366036 | 1285 | 1 | 5 | 0.5 | 2 |
| ## 3 | 0 | 0.1776015308 | 0.1623427532 | 0.75174145 | 1303 | 1 | 5 | -0.2 | 3 |
| ## 4 | 0 | 1.1489900796 | 1.0434676933 | -0.13530694 | 1314 | 1 | 5 | -1.0 | 4 |
| ## 5 | 0 | 0.1109932022 | 0.1033406656 | 0.82771334 | 1285 | 1 | 5 | 1.3 | 1 |
| ## 6 | 0 | -0.0522757849 | -0.0514143187 | 1.03493506 | 1314 | 1 | 5 | 0.5 | 2 |
| ## 7 | 0 | -0.6498895420 | -0.6468091105 | 1.64206918 | 1325 | 1 | 5 | -0.2 | 3 |
| ## 8 | 0 | -0.5496777148 | -0.4930351190 | 1.38998820 | 1345 | 1 | 5 | -1.0 | 4 |
| ## 9 | 0 | -0.0894327803 | -0.0864891226 | 1.05357437 | 1274 | 1 | 5 | 1.3 | 1 |
| ## 10 | 0 | 0.2421944750 | 0.2083839493 | 0.65201532 | 1281 | 1 | 5 | 0.5 | 2 |
| ## 11 | 0 | -0.1251918147 | -0.1458312871 | 1.31069408 | 1346 | 1 | 5 | -0.2 | 3 |
| ## 12 | 0 | 1.0538592793 | 1.0243376369 | -0.05235053 | 1319 | 1 | 5 | -1.0 | 4 |
| ## 13 | 0 | 0.1520156321 | 0.1523051148 | 0.84959918 | 1339 | 1 | 5 | 1.3 | 1 |
| ## 14 | 0 | -0.0638612763 | -0.0715042347 | 1.19118487 | 1345 | 1 | 5 | 0.5 | 2 |
| ## 15 | 0 | -0.6719371714 | -0.8175470510 | 2.03424868 | 1279 | 1 | 5 | -0.2 | 3 |
| ## 16 | 0 | 0.6518160261 | 0.7001735830 | 0.37401538 | 1343 | 1 | 5 | -1.0 | 4 |
| ## 17 | 0 | 0.3456767212 | 0.3547691896 | 0.67153420 | 1254 | 1 | 5 | 1.3 | 1 |
| ## 18 | 0 | 0.2792297351 | 0.3344355396 | 0.86327193 | 1255 | 1 | 5 | 0.5 | 2 |
| ## 19 | 0 | 0.3718030960 | 0.4475209999 | 0.75612955 | 1349 | 1 | 5 | -0.2 | 3 |
| ## 20 | 0 | 0.1010410339 | 0.1283305550 | 1.14175299 | 1298 | 1 | 5 | -1.0 | 4 |
| ## 21 | 0 | -0.1228527861 | -0.1301872864 | 1.18988882 | 1347 | 1 | 5 | 1.3 | 1 |
| ## 22 | 0 | -0.1377783892 | -0.1502562893 | 1.24082129 | 1337 | 1 | 5 | 0.5 | 2 |
| ## 23 | 0 | -0.1047325601 | -0.1227454995 | 1.29473537 | 1330 | 1 | 5 | -0.2 | 3 |
| ## 24 | 0 | 0.2266474710 | 0.2653142838 | 0.90528904 | 1328 | 1 | 5 | -1.0 | 4 |
| ## 25 | 0 | -0.0627650441 | -0.0610302412 | 1.03339061 | 1407 | 2 | 5 | 1.2 | 1 |
| ## 26 | 0 | -0.1697416515 | -0.1479606380 | 1.01964202 | 1342 | 2 | 5 | 0.5 | 2 |
| ## 27 | 0 | 0.0705639483 | 0.0658242292 | 0.86700664 | 1299 | 2 | 5 | -0.2 | 3 |
| ## 28 | 0 | 0.6512417642 | 0.6929853499 | 0.37111310 | 1309 | 2 | 5 | -1.0 | 4 |
| ## 29 | 0 | 0.6760805126 | 0.6929715084 | 0.33201220 | 1283 | 2 | 5 | 1.3 | 1 |
| ## 30 | 0 | 0.0054976987 | 0.0054736394 | 0.99015011 | 1320 | 2 | 5 | 0.5 | 2 |
| ## 31 | 0 | 0.2013578676 | 0.2166556301 | 0.85931738 | 1323 | 2 | 5 | -0.2 | 3 |
| ## 32 | 0 | -0.7662261662 | -0.7976343462 | 1.83862509 | 1328 | 2 | 5 | -1.0 | 4 |
| ## 33 | 0 | 0.0206867810 | 0.0218624149 | 1.03496778 | 1422 | 2 | 5 | 1.2 | 1 |
| ## 34 | 0 | -0.3574689371 | -0.3647305703 | 1.38504460 | 1294 | 2 | 5 | 0.5 | 2 |
| ## 35 | 0 | 0.3851097718 | 0.4975982524 | 0.79449634 | 1361 | 2 | 5 | -0.2 | 3 |
| ## 36 | 0 | 0.4295793450 | 0.5271674887 | 0.70000392 | 1386 | 2 | 5 | -1.0 | 4 |
| ## 37 | 0 | -0.4093085176 | -0.4691212843 | 1.61525254 | 1270 | 2 | 5 | 1.3 | 1 |
| ## 38 | 0 | 0.1015188310 | 0.1302512528 | 1.15277429 | 1276 | 2 | 5 | 0.5 | 2 |
| ## 39 | 0 | 0.3281065432 | 0.4032303359 | 0.82573124 | 1350 | 2 | 5 | -0.2 | 3 |
| ## 40 | 0 | -0.0680236400 | -0.0752892372 | 1.18209912 | 1270 | 2 | 5 | -1.0 | 4 |
| ## 41 | 0 | -0.3070455558 | -0.3580483479 | 1.52415657 | 1387 | 2 | 5 | 1.2 | 1 |
| ## 42 | 0 | 0.0679395272 | 0.0636074109 | 0.87262829 | 1297 | 2 | 5 | 0.5 | 2 |
| ## 43 | 0 | 1.1782628914 | 1.2006942469 | -0.18165660 | 1335 | 2 | 5 | -0.2 | 3 |
| ## 44 | 0 | 0.4271215606 | 0.5196194390 | 0.69694158 | 1297 | 2 | 5 | -1.0 | 4 |
| ## 45 | 0 | 0.6100282110 | 0.6279043623 | 0.40139945 | 1415 | 2 | 5 | 1.2 | 1 |
| ## 46 | 0 | -0.3037506911 | -0.2746127049 | 1.17868540 | 1318 | 2 | 5 | 0.5 | 2 |
| ## 47 | 0 | 0.0508394549 | 0.0724939756 | 1.35344530 | 1309 | 2 | 5 | -0.2 | 3 |

| | | | | | | | | | |
|--------|---|---------------|---------------|-------------|------|---|---|------|---|
| ## 48 | 0 | 0.2904848143 | 0.3055717381 | 0.74636531 | 1323 | 2 | 5 | -1.0 | 4 |
| ## 49 | 0 | -0.1328534928 | -0.1095697032 | 0.93431056 | 1279 | 3 | 5 | 1.3 | 1 |
| ## 50 | 0 | 0.0665801552 | 0.0614288129 | 0.86120065 | 1421 | 3 | 5 | 0.4 | 2 |
| ## 51 | 0 | -0.8498714769 | -0.9627030691 | 2.09546619 | 1289 | 3 | 5 | -0.2 | 3 |
| ## 52 | 0 | 0.4713456692 | 0.5074509194 | 0.56914945 | 1345 | 3 | 5 | -1.0 | 4 |
| ## 53 | 0 | -0.3250422299 | -0.3021342254 | 1.23165722 | 1412 | 3 | 5 | 1.2 | 1 |
| ## 54 | 0 | 0.7517150340 | 0.7852058212 | 0.25934668 | 1321 | 3 | 5 | 0.5 | 2 |
| ## 55 | 0 | -0.2700198033 | -0.2661377652 | 1.25176090 | 1308 | 3 | 5 | -0.2 | 3 |
| ## 56 | 0 | -1.0019825342 | -1.0041952039 | 2.00640350 | 1349 | 3 | 5 | -1.0 | 4 |
| ## 57 | 0 | -0.3387002798 | -0.3734550248 | 1.47606712 | 1281 | 3 | 5 | 1.3 | 1 |
| ## 58 | 0 | 0.3995088578 | 0.4264386523 | 0.64096860 | 1330 | 3 | 5 | 0.5 | 2 |
| ## 59 | 0 | -0.1574075680 | -0.1462348333 | 1.07525518 | 1357 | 3 | 5 | -0.2 | 3 |
| ## 60 | 0 | 1.2501589888 | 1.3975113633 | -0.27964446 | 1300 | 3 | 5 | -1.0 | 4 |
| ## 61 | 0 | 0.1660737697 | 0.1732759374 | 0.87009134 | 1401 | 3 | 5 | 1.2 | 1 |
| ## 62 | 0 | 1.1569040811 | 1.0725827349 | -0.14546807 | 1283 | 3 | 5 | 0.5 | 2 |
| ## 63 | 0 | -0.0509683412 | -0.0520931680 | 1.07416229 | 1288 | 3 | 5 | -0.2 | 3 |
| ## 64 | 0 | 1.0174696247 | 1.2101785318 | -0.02077837 | 1378 | 3 | 5 | -1.0 | 4 |
| ## 65 | 0 | 0.1828905044 | 0.2025795009 | 0.90507506 | 1272 | 3 | 5 | 1.3 | 1 |
| ## 66 | 0 | 0.0934519276 | 0.1139321094 | 1.10521994 | 1323 | 3 | 5 | 0.5 | 2 |
| ## 67 | 0 | 0.3610805671 | 0.4595072637 | 0.81308203 | 1333 | 3 | 5 | -0.2 | 3 |
| ## 68 | 0 | -0.9024495057 | -1.0281991318 | 2.16754169 | 1385 | 3 | 5 | -1.0 | 4 |
| ## 69 | 0 | 0.5607082819 | 0.5694300474 | 0.44612486 | 1270 | 3 | 5 | 1.3 | 1 |
| ## 70 | 0 | 0.6219869352 | 0.7774006718 | 0.47246589 | 1345 | 3 | 5 | 0.5 | 2 |
| ## 71 | 0 | 0.6165804176 | 0.9351663243 | 0.58153174 | 1304 | 3 | 5 | -0.2 | 3 |
| ## 72 | 0 | 0.0564700978 | 0.0697264496 | 1.16502349 | 1302 | 3 | 5 | -1.0 | 4 |
| ## 73 | 0 | -1.0528919846 | -1.0020996712 | 1.95385891 | 1255 | 4 | 5 | 1.3 | 1 |
| ## 74 | 0 | 0.0471458694 | 0.0410476236 | 0.82960391 | 1336 | 4 | 5 | 0.5 | 2 |
| ## 75 | 0 | -0.1698903079 | -0.1437425098 | 0.98983262 | 1325 | 4 | 5 | -0.2 | 3 |
| ## 76 | 0 | 0.5687346781 | 0.4727559988 | 0.35848573 | 1313 | 4 | 5 | -1.0 | 4 |
| ## 77 | 0 | 0.2740116793 | 0.2478956283 | 0.65679438 | 1269 | 4 | 5 | 1.3 | 1 |
| ## 78 | 0 | 0.1558926577 | 0.1636395291 | 0.88605410 | 1310 | 4 | 5 | 0.5 | 2 |
| ## 79 | 0 | 0.8817939345 | 1.2081953682 | 0.16196077 | 1255 | 4 | 5 | -0.2 | 3 |
| ## 80 | 0 | -0.4187027219 | -0.5061205270 | 1.71490304 | 1335 | 4 | 5 | -1.0 | 4 |
| ## 81 | 0 | -0.0904778871 | -0.0838664791 | 1.01079439 | 1270 | 4 | 5 | 1.3 | 1 |
| ## 82 | 0 | 0.9826029756 | 1.0746901588 | 0.01902743 | 1322 | 4 | 5 | 0.5 | 2 |
| ## 83 | 0 | -0.8442847650 | -0.9602357561 | 2.09757211 | 1345 | 4 | 5 | -0.2 | 3 |
| ## 84 | 0 | 0.7648354363 | 0.8926974434 | 0.27447840 | 1356 | 4 | 5 | -1.0 | 4 |
| ## 85 | 0 | -0.1860356052 | -0.2115899676 | 1.34895272 | 1398 | 4 | 5 | 1.2 | 1 |
| ## 86 | 0 | -0.7314516275 | -0.7706601432 | 1.82426385 | 1293 | 4 | 5 | 0.5 | 2 |
| ## 87 | 0 | 0.0002503873 | 0.0003058893 | 1.22135904 | 1364 | 4 | 5 | -0.2 | 3 |
| ## 88 | 0 | -0.1296954189 | -0.1302418043 | 1.13445464 | 1363 | 4 | 5 | -1.0 | 4 |
| ## 89 | 0 | 0.8177878021 | 0.6900021939 | 0.15374015 | 1371 | 4 | 5 | 1.2 | 1 |
| ## 90 | 0 | 0.2948358460 | 0.3640718587 | 0.87075716 | 1299 | 4 | 5 | 0.5 | 2 |
| ## 91 | 0 | 1.0316654998 | 1.2196189903 | -0.03743446 | 1335 | 4 | 5 | -0.2 | 3 |
| ## 92 | 0 | -0.0705996739 | -0.0982045824 | 1.48921076 | 1334 | 4 | 5 | -1.0 | 4 |
| ## 93 | 0 | -0.1851494748 | -0.2142131729 | 1.37118741 | 1287 | 4 | 5 | 1.3 | 1 |
| ## 94 | 0 | -0.3994360618 | -0.4383503043 | 1.53577326 | 1284 | 4 | 5 | 0.5 | 2 |
| ## 95 | 0 | 0.3988697475 | 0.5885210102 | 0.88695065 | 1371 | 4 | 5 | -0.2 | 3 |
| ## 96 | 0 | -0.1271347109 | -0.1495164482 | 1.32556386 | 1319 | 4 | 5 | -1.0 | 4 |
| ## 97 | 0 | 0.2167795419 | 0.1878657991 | 0.67875564 | 1322 | 5 | 5 | 1.3 | 1 |
| ## 98 | 0 | -0.4944042703 | -0.4044141875 | 1.22239698 | 1284 | 5 | 5 | 0.5 | 2 |
| ## 99 | 0 | -0.6578445801 | -0.7358825578 | 1.85450933 | 1348 | 5 | 5 | -0.2 | 3 |
| ## 100 | 0 | -0.1065116664 | -0.0999500664 | 1.03834555 | 1331 | 5 | 5 | -1.0 | 4 |
| ## 101 | 0 | -0.0478121062 | -0.0491924306 | 1.07806220 | 1428 | 5 | 5 | 1.2 | 1 |

| | | | | | | | | | |
|--------|--------|---------------|---------------|------------|------|---|---|------|---|
| ## 102 | 0 | 0.3459542494 | 0.3336081154 | 0.63070470 | 1301 | 5 | 5 | 0.5 | 2 |
| ## 103 | 0 | -0.6594748955 | -0.7115665761 | 1.79055621 | 1336 | 5 | 5 | -0.2 | 3 |
| ## 104 | 0 | 0.3196873798 | 0.3450270048 | 0.73423676 | 1345 | 5 | 5 | -1.0 | 4 |
| ## 105 | 0 | 0.6831296521 | 0.6695793362 | 0.31058502 | 1407 | 5 | 5 | 1.2 | 1 |
| ## 106 | 0 | 0.0365230471 | 0.0393896197 | 1.03909706 | 1266 | 5 | 5 | 0.5 | 2 |
| ## 107 | 0 | 0.1358810905 | 0.1519312262 | 0.96618775 | 1340 | 5 | 5 | -0.2 | 3 |
| ## 108 | 0 | -0.0279699288 | -0.0273953566 | 1.00685286 | 1259 | 5 | 5 | -1.0 | 4 |
| ## 109 | 0 | 0.5564476864 | 0.6319251260 | 0.50371645 | 1290 | 5 | 5 | 1.3 | 1 |
| ## 110 | 0 | -0.3738397473 | -0.3636929547 | 1.33655086 | 1311 | 5 | 5 | 0.5 | 2 |
| ## 111 | 0 | 0.1436135048 | 0.1914340793 | 1.14154696 | 1315 | 5 | 5 | -0.2 | 3 |
| ## 112 | 0 | 0.6958330148 | 0.6667497760 | 0.29145393 | 1351 | 5 | 5 | -1.0 | 4 |
| ## 113 | 0 | -0.0209315329 | -0.0190198273 | 0.92768846 | 1335 | 5 | 5 | 1.3 | 1 |
| ## 114 | 0 | -0.4949490715 | -0.5731385331 | 1.73111329 | 1307 | 5 | 5 | 0.5 | 2 |
| ## 115 | 0 | 0.2831792138 | 0.2487168420 | 0.62958506 | 1351 | 5 | 5 | -0.2 | 3 |
| ## 116 | 0 | 0.2618088938 | 0.3316872612 | 0.93521875 | 1311 | 5 | 5 | -1.0 | 4 |
| ## 117 | 0 | -0.0330668065 | -0.0324169812 | 1.01276509 | 1264 | 5 | 5 | 1.3 | 1 |
| ## 118 | 0 | 0.4429488698 | 0.4775619557 | 0.60058044 | 1366 | 5 | 5 | 0.5 | 2 |
| ## 119 | 0 | -0.5204022651 | -0.7241110385 | 2.11555586 | 1350 | 5 | 5 | -0.2 | 3 |
| ## 120 | 0 | -0.3228685978 | -0.3472403008 | 1.42272520 | 1295 | 5 | 5 | -1.0 | 4 |
| ## | hercov | | | | | | | | |
| ## 1 | 0.0 | | | | | | | | |
| ## 2 | 0.0 | | | | | | | | |
| ## 3 | 0.0 | | | | | | | | |
| ## 4 | 0.0 | | | | | | | | |
| ## 5 | 0.2 | | | | | | | | |
| ## 6 | 0.2 | | | | | | | | |
| ## 7 | 0.2 | | | | | | | | |
| ## 8 | 0.2 | | | | | | | | |
| ## 9 | 0.4 | | | | | | | | |
| ## 10 | 0.4 | | | | | | | | |
| ## 11 | 0.4 | | | | | | | | |
| ## 12 | 0.4 | | | | | | | | |
| ## 13 | 0.6 | | | | | | | | |
| ## 14 | 0.6 | | | | | | | | |
| ## 15 | 0.6 | | | | | | | | |
| ## 16 | 0.6 | | | | | | | | |
| ## 17 | 0.8 | | | | | | | | |
| ## 18 | 0.8 | | | | | | | | |
| ## 19 | 0.8 | | | | | | | | |
| ## 20 | 0.8 | | | | | | | | |
| ## 21 | 1.0 | | | | | | | | |
| ## 22 | 1.0 | | | | | | | | |
| ## 23 | 1.0 | | | | | | | | |
| ## 24 | 1.0 | | | | | | | | |
| ## 25 | 0.0 | | | | | | | | |
| ## 26 | 0.0 | | | | | | | | |
| ## 27 | 0.0 | | | | | | | | |
| ## 28 | 0.0 | | | | | | | | |
| ## 29 | 0.2 | | | | | | | | |
| ## 30 | 0.2 | | | | | | | | |
| ## 31 | 0.2 | | | | | | | | |
| ## 32 | 0.2 | | | | | | | | |
| ## 33 | 0.4 | | | | | | | | |
| ## 34 | 0.4 | | | | | | | | |

| | |
|-------|-----|
| ## 35 | 0.4 |
| ## 36 | 0.4 |
| ## 37 | 0.6 |
| ## 38 | 0.6 |
| ## 39 | 0.6 |
| ## 40 | 0.6 |
| ## 41 | 0.8 |
| ## 42 | 0.8 |
| ## 43 | 0.8 |
| ## 44 | 0.8 |
| ## 45 | 1.0 |
| ## 46 | 1.0 |
| ## 47 | 1.0 |
| ## 48 | 1.0 |
| ## 49 | 0.0 |
| ## 50 | 0.0 |
| ## 51 | 0.0 |
| ## 52 | 0.0 |
| ## 53 | 0.2 |
| ## 54 | 0.2 |
| ## 55 | 0.2 |
| ## 56 | 0.2 |
| ## 57 | 0.4 |
| ## 58 | 0.4 |
| ## 59 | 0.4 |
| ## 60 | 0.4 |
| ## 61 | 0.6 |
| ## 62 | 0.6 |
| ## 63 | 0.6 |
| ## 64 | 0.6 |
| ## 65 | 0.8 |
| ## 66 | 0.8 |
| ## 67 | 0.8 |
| ## 68 | 0.8 |
| ## 69 | 1.0 |
| ## 70 | 1.0 |
| ## 71 | 1.0 |
| ## 72 | 1.0 |
| ## 73 | 0.0 |
| ## 74 | 0.0 |
| ## 75 | 0.0 |
| ## 76 | 0.0 |
| ## 77 | 0.2 |
| ## 78 | 0.2 |
| ## 79 | 0.2 |
| ## 80 | 0.2 |
| ## 81 | 0.4 |
| ## 82 | 0.4 |
| ## 83 | 0.4 |
| ## 84 | 0.4 |
| ## 85 | 0.6 |
| ## 86 | 0.6 |
| ## 87 | 0.6 |
| ## 88 | 0.6 |


```
## 89      0.8
## 90      0.8
## 91      0.8
## 92      0.8
## 93      1.0
## 94      1.0
## 95      1.0
## 96      1.0
## 97      0.0
## 98      0.0
## 99      0.0
## 100     0.0
## 101     0.2
## 102     0.2
## 103     0.2
## 104     0.2
## 105     0.4
## 106     0.4
## 107     0.4
## 108     0.4
## 109     0.6
## 110     0.6
## 111     0.6
## 112     0.6
## 113     0.8
## 114     0.8
## 115     0.8
## 116     0.8
## 117     1.0
## 118     1.0
## 119     1.0
## 120     1.0
```

```
rows_hercov2 <- rows_hercov2 %>% mutate(h2_l = h2_disease * (prev/N) * (1-prev/N) / dnorm(prev/N)^2)
```

```
ggplot(rows_hercov2, aes(x=hercov, y=h2_disease)) +
  geom_point(aes(col=factor(n+1))) +
  #geom_point(aes(y=h2_l, col="expected h2_l (one symptom)")) +
  labs(x="Covariance heritability",
       col="Number of symptoms past threshold",
       y="Disease heritability")
```

