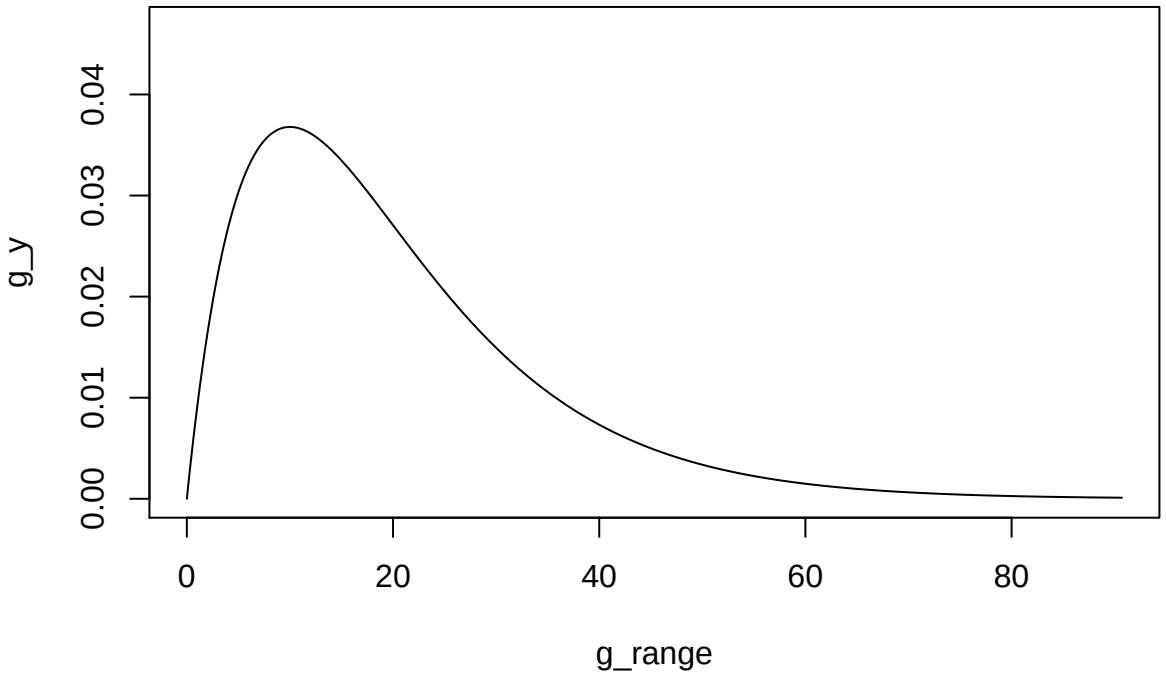
Version 2: 4 clusters; Fix cluster label switching u,v; unif; fix w,theta [0.05,1]

Simulate data

```
I <- 50
K <- 4
S <- 10

# choose diffuse priors for gamma
a_gamma <- 2
b_gamma <- 10

avrg <- a_gamma * b_gamma
std.dv <- sqrt(a_gamma*b_gamma^2)
g_range = seq(0, avrg + 5*std.dv, 0.01)
g_y = dgamma(g_range, a_gamma, rate = 1/b_gamma)
plot(g_range, g_y, type = "l", ylim=c(0, max(g_y) + 0.01))
```




```
set.seed(123)

a <- matrix(NA, nrow=K, ncol=S)
b <- matrix(NA, nrow=K, ncol=S)
for (s in 1:S) {
  a[, s] <- rgamma(K, a_gamma, rate = 1/b_gamma)
  b[, s] <- rgamma(K, a_gamma, rate = 1/b_gamma)
}

# reorder a,b matrices to match ordering of means (U) in S1
```

```
U <- a/(a+b)
V <- a+b
U.ordered <- U[order(U[,1]), ]
a.ordered <- a[order(U[,1]), ]
b.ordered <- b[order(U[,1]), ]
V.ordered <- V[order(U[,1]), ]

pi <- as.vector(rdirichlet(1, rep(1, K)))
z <- sample(1:K, size = I, replace = T, prob = pi)

w <- matrix(NA, nrow=I, ncol=S)
for (s in 1:S) {
  w[, s] <- rbeta(I, a.ordered[,s][z], b.ordered[,s][z])
}

tcn <- matrix(2, nrow=I, ncol=S)
m <- matrix(rep(sample(1:2, size = I, replace = T), S), nrow=I, ncol=S)

calcTheta <- function(m, tcn, w) {
  (m * w) / (tcn * w + 2*(1-w))
}
theta <- calcTheta(m, tcn, w)

n <- replicate(S, rpois(I, 100))
y <- matrix(NA, nrow=I, ncol=S)
for (i in 1:I) {
  for (s in 1:S) {
    y[i, s] <- rbinom(1, n[i, s], theta[i,s])
  }
}
```

JAGS

```
jags.file <- file.path(models.dir, "v3_uv_unif.jags")

test.data <- list("I" = I, "S" = S, "K" = K,
                  "y" = y, "n" = n,
                  "m" = m, "tcn" = tcn)
jags.m <- jags.model(jags.file, test.data,
                     n.chains = 1,
                     inits = list(".RNG.name" = "base::Wichmann-Hill",
                                  ".RNG.seed" = 12))
```

```
## Compiling model graph
##    Resolving undeclared variables
##    Allocating nodes
## Graph information:
##    Observed stochastic nodes: 500
##    Unobserved stochastic nodes: 631
##    Total graph size: 8481
##
## Initializing model
```

```
params <- c("z", "w", "U", "V")
samps <- coda.samples(jags.m, params, n.iter=5000, thin=5)
s <- summary(samps)
effectiveSize(samps)
```

```
##      U[1,1]      U[2,1]      U[3,1]      U[4,1]      U[1,2]      U[2,2]
##  192.335899   14.842977   14.925841   38.286098   13.737711  813.812827
##      U[3,2]      U[4,2]      U[1,3]      U[2,3]      U[3,3]      U[4,3]
## 1000.000000 1000.000000   17.907282  818.712270 1000.000000 1000.000000
##      U[1,4]      U[2,4]      U[3,4]      U[4,4]      U[1,5]      U[2,5]
##   15.205092  530.069611 1000.000000 1150.223076   15.015415 1000.000000
##      U[3,5]      U[4,5]      U[1,6]      U[2,6]      U[3,6]      U[4,6]
##  865.189447 1000.000000   15.668087  880.376324  857.570268 1000.000000
##      U[1,7]      U[2,7]      U[3,7]      U[4,7]      U[1,8]      U[2,8]
##   10.596089  993.065463  471.069380  812.032532  909.152830  848.633407
##      U[3,8]      U[4,8]      U[1,9]      U[2,9]      U[3,9]      U[4,9]
## 1100.581642 1000.000000   21.996293 1000.000000 1000.000000 1000.000000
##     U[1,10]     U[2,10]     U[3,10]     U[4,10]      V[1,1]      V[2,1]
##   18.603064 1000.000000 1000.000000 1000.000000   23.827934  168.749222
##      V[3,1]      V[4,1]      V[1,2]      V[2,2]      V[3,2]      V[4,2]
##  282.181804  974.192094   30.172740  855.270513  250.127861  888.851779
##      V[1,3]      V[2,3]      V[3,3]      V[4,3]      V[1,4]      V[2,4]
##   19.545174  873.268917  562.261784  751.626120   76.126586  534.726492
##      V[3,4]      V[4,4]      V[1,5]      V[2,5]      V[3,5]      V[4,5]
##  235.365364  841.594083   37.581137  841.150663  680.969669  894.766434
##      V[1,6]      V[2,6]      V[3,6]      V[4,6]      V[1,7]      V[2,7]
##   16.148011  756.493278  665.134533  838.684896   35.297777  841.167412
##      V[3,7]      V[4,7]      V[1,8]      V[2,8]      V[3,8]      V[4,8]
##  787.799518  713.448225  121.218235  973.724263 1000.000000 1000.000000
##      V[1,9]      V[2,9]      V[3,9]      V[4,9]     V[1,10]     V[2,10]
##   52.266575  896.986781  854.291336  894.737107   27.740788  892.361517
##     V[3,10]     V[4,10]      w[1,1]      w[2,1]      w[3,1]      w[4,1]
## 1000.000000 1000.000000 1159.477666 1000.000000  821.541045 1000.000000
##      w[5,1]      w[6,1]      w[7,1]      w[8,1]      w[9,1]     w[10,1]
## 1055.873103 1000.000000  231.244710 1135.591597  280.806963  832.015400
##     w[11,1]     w[12,1]     w[13,1]     w[14,1]     w[15,1]     w[16,1]
## 1000.000000 1000.000000 1000.000000 1060.381056  901.721915 1000.000000
##     w[17,1]     w[18,1]     w[19,1]     w[20,1]     w[21,1]     w[22,1]
##  896.478453 1000.000000 1000.000000  902.047291 1000.000000 1000.000000
##     w[23,1]     w[24,1]     w[25,1]     w[26,1]     w[27,1]     w[28,1]
## 1000.000000 1000.000000 1000.000000 1000.000000  960.567407  900.377837
##     w[29,1]     w[30,1]     w[31,1]     w[32,1]     w[33,1]     w[34,1]
## 1000.000000  863.755389 1119.314568 1000.000000 1000.000000  830.808829
##     w[35,1]     w[36,1]     w[37,1]     w[38,1]     w[39,1]     w[40,1]
##  905.916037 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[41,1]     w[42,1]     w[43,1]     w[44,1]     w[45,1]     w[46,1]
## 1000.000000 1000.000000  860.102999 1001.264448 1000.000000  893.767200
##     w[47,1]     w[48,1]     w[49,1]     w[50,1]      w[1,2]      w[2,2]
##  744.636982 1000.000000  709.127859 1182.798309 1000.000000 1000.000000
##      w[3,2]      w[4,2]      w[5,2]      w[6,2]      w[7,2]      w[8,2]
## 1000.000000 1000.000000 1203.988767  700.192287 1093.287332 1097.491142
##      w[9,2]     w[10,2]     w[11,2]     w[12,2]     w[13,2]     w[14,2]
## 1049.934751  706.223678  830.237176 1000.000000 1000.000000  861.177205
##     w[15,2]     w[16,2]     w[17,2]     w[18,2]     w[19,2]     w[20,2]
```

```
## 1000.000000  694.139630 1000.000000  708.356906 1000.000000 1000.000000
##     w[21,2]     w[22,2]     w[23,2]     w[24,2]     w[25,2]     w[26,2]
## 1000.000000 1000.000000 1000.000000 1027.781143 1000.000000 1000.000000
##     w[27,2]     w[28,2]     w[29,2]     w[30,2]     w[31,2]     w[32,2]
## 1000.000000 1000.000000 1000.000000 1000.000000  428.681229  473.313833
##     w[33,2]     w[34,2]     w[35,2]     w[36,2]     w[37,2]     w[38,2]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[39,2]     w[40,2]     w[41,2]     w[42,2]     w[43,2]     w[44,2]
## 1000.000000 1000.000000 1214.489487 1318.757077 1000.000000 1000.000000
##     w[45,2]     w[46,2]     w[47,2]     w[48,2]     w[49,2]     w[50,2]
## 1000.000000 1000.000000  839.544486 1000.000000  915.867926 1000.000000
##      w[1,3]      w[2,3]      w[3,3]      w[4,3]      w[5,3]      w[6,3]
## 1000.000000 1000.000000  719.772340 1153.577629 1000.000000  930.514172
##      w[7,3]      w[8,3]      w[9,3]     w[10,3]     w[11,3]     w[12,3]
## 1183.285658 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[13,3]     w[14,3]     w[15,3]     w[16,3]     w[17,3]     w[18,3]
## 1106.322523  821.413110 1000.000000 1000.000000 1000.000000 1000.000000
##     w[19,3]     w[20,3]     w[21,3]     w[22,3]     w[23,3]     w[24,3]
##  891.950680  810.986952 1000.000000 1000.000000  739.768845 1000.000000
##     w[25,3]     w[26,3]     w[27,3]     w[28,3]     w[29,3]     w[30,3]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[31,3]     w[32,3]     w[33,3]     w[34,3]     w[35,3]     w[36,3]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[37,3]     w[38,3]     w[39,3]     w[40,3]     w[41,3]     w[42,3]
## 1000.000000 1000.000000 1000.000000  685.707334 1000.000000 1000.000000
##     w[43,3]     w[44,3]     w[45,3]     w[46,3]     w[47,3]     w[48,3]
##  993.140269 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[49,3]     w[50,3]      w[1,4]      w[2,4]      w[3,4]      w[4,4]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000  899.951337
##      w[5,4]      w[6,4]      w[7,4]      w[8,4]      w[9,4]     w[10,4]
## 1000.000000 1000.000000  801.455804 1000.000000  722.579942 1000.000000
##     w[11,4]     w[12,4]     w[13,4]     w[14,4]     w[15,4]     w[16,4]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000  842.625545
##     w[17,4]     w[18,4]     w[19,4]     w[20,4]     w[21,4]     w[22,4]
## 1000.000000  881.422651 1280.235941 1000.000000 1000.000000 1000.000000
##     w[23,4]     w[24,4]     w[25,4]     w[26,4]     w[27,4]     w[28,4]
## 1000.000000 1000.000000  746.870533 1000.000000  855.657864  698.451304
##     w[29,4]     w[30,4]     w[31,4]     w[32,4]     w[33,4]     w[34,4]
## 1000.000000 1000.000000 1000.000000  904.479085 1000.000000 1000.000000
##     w[35,4]     w[36,4]     w[37,4]     w[38,4]     w[39,4]     w[40,4]
##  851.341430 1000.000000 1105.508241 1000.000000  898.445769 1000.000000
##     w[41,4]     w[42,4]     w[43,4]     w[44,4]     w[45,4]     w[46,4]
## 1135.872252 1000.000000  875.415466 1000.000000  966.267492  968.024808
##     w[47,4]     w[48,4]     w[49,4]     w[50,4]      w[1,5]      w[2,5]
##  819.433809 1000.000000  733.639469 1000.000000 1000.000000 1005.300992
##      w[3,5]      w[4,5]      w[5,5]      w[6,5]      w[7,5]      w[8,5]
## 1000.000000  910.482412 1000.000000 1000.000000 1000.000000 1000.000000
##      w[9,5]     w[10,5]     w[11,5]     w[12,5]     w[13,5]     w[14,5]
## 1000.000000 1000.000000  767.321053 1136.349164 1000.000000 1000.000000
##     w[15,5]     w[16,5]     w[17,5]     w[18,5]     w[19,5]     w[20,5]
## 1000.000000 1000.000000 1109.855482 1000.000000 1000.000000 1000.000000
##     w[21,5]     w[22,5]     w[23,5]     w[24,5]     w[25,5]     w[26,5]
## 1000.000000 1000.000000  887.016809  703.885314 1000.000000  903.913383
##     w[27,5]     w[28,5]     w[29,5]     w[30,5]     w[31,5]     w[32,5]
```

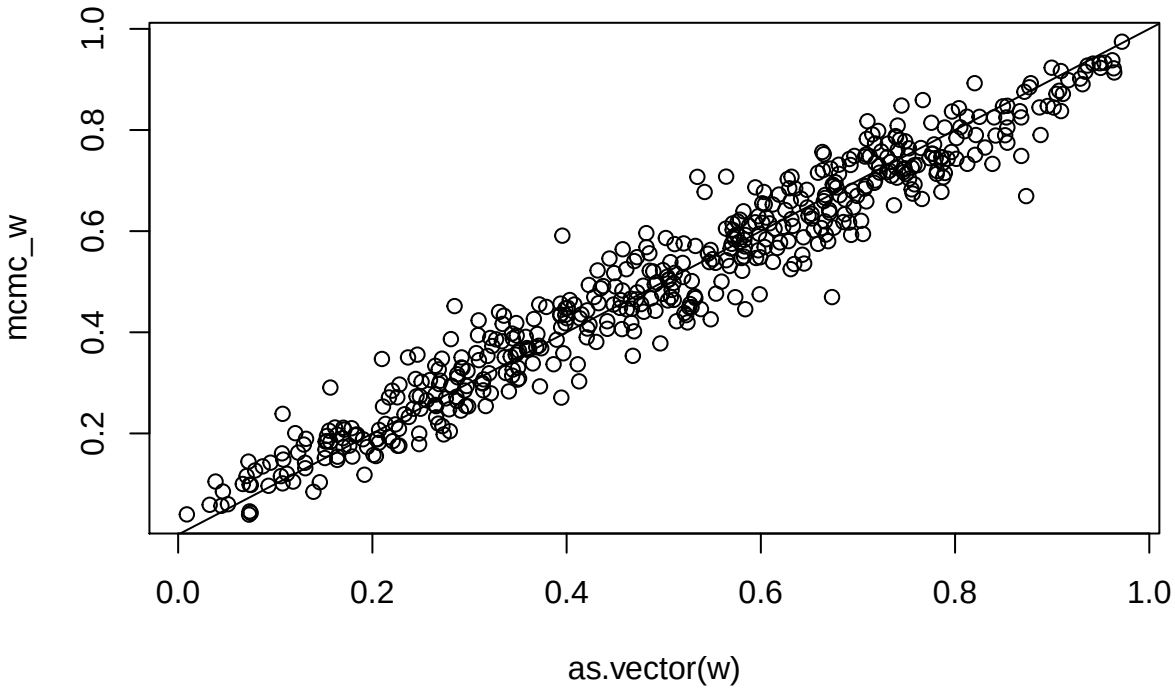
```
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[33,5]     w[34,5]     w[35,5]     w[36,5]     w[37,5]     w[38,5]
## 1000.000000  540.132785  945.971033  848.367368 1000.000000 1000.000000
##     w[39,5]     w[40,5]     w[41,5]     w[42,5]     w[43,5]     w[44,5]
## 1000.000000 1146.128501  871.280798 1000.000000  924.497718 1000.000000
##     w[45,5]     w[46,5]     w[47,5]     w[48,5]     w[49,5]     w[50,5]
## 1000.000000  185.843997 1000.000000 1000.000000 1000.000000 1092.978417
##      w[1,6]      w[2,6]      w[3,6]      w[4,6]      w[5,6]      w[6,6]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1121.203877
##      w[7,6]      w[8,6]      w[9,6]     w[10,6]     w[11,6]     w[12,6]
## 1000.000000 1156.809329  824.176935 1000.000000 1000.000000 1000.000000
##     w[13,6]     w[14,6]     w[15,6]     w[16,6]     w[17,6]     w[18,6]
## 1000.000000 1000.000000  886.784823 1000.000000  878.319931 1000.000000
##     w[19,6]     w[20,6]     w[21,6]     w[22,6]     w[23,6]     w[24,6]
## 1000.000000 1000.000000 1000.000000  668.090331 1000.000000 1000.000000
##     w[25,6]     w[26,6]     w[27,6]     w[28,6]     w[29,6]     w[30,6]
## 1000.000000 1000.000000  870.613260  925.227399 1000.000000 1000.000000
##     w[31,6]     w[32,6]     w[33,6]     w[34,6]     w[35,6]     w[36,6]
## 1000.000000 1140.397713 1165.092753 1000.000000 1000.000000 1000.000000
##     w[37,6]     w[38,6]     w[39,6]     w[40,6]     w[41,6]     w[42,6]
## 1000.000000 1348.096848 1138.982527 1000.000000  739.021913  914.528298
##     w[43,6]     w[44,6]     w[45,6]     w[46,6]     w[47,6]     w[48,6]
## 1020.581881 1000.000000 1000.000000 1178.616915 1000.000000 1000.000000
##     w[49,6]     w[50,6]      w[1,7]      w[2,7]      w[3,7]      w[4,7]
## 1000.000000  968.924497 1000.000000 1000.000000 1000.000000  621.886044
##      w[5,7]      w[6,7]      w[7,7]      w[8,7]      w[9,7]     w[10,7]
## 1000.000000  912.391078 1000.000000 1084.510296 1000.000000 1000.000000
##     w[11,7]     w[12,7]     w[13,7]     w[14,7]     w[15,7]     w[16,7]
## 1000.000000 1000.000000  840.009716 1000.000000  694.967304 1000.000000
##     w[17,7]     w[18,7]     w[19,7]     w[20,7]     w[21,7]     w[22,7]
## 1000.000000 1000.000000  968.426578 1000.000000 1000.000000 1014.594483
##     w[23,7]     w[24,7]     w[25,7]     w[26,7]     w[27,7]     w[28,7]
##  911.948427 1000.000000 1025.303703 1000.000000 1000.000000 1000.000000
##     w[29,7]     w[30,7]     w[31,7]     w[32,7]     w[33,7]     w[34,7]
## 1000.000000 1000.000000  851.668369 1000.000000 1000.000000  554.377752
##     w[35,7]     w[36,7]     w[37,7]     w[38,7]     w[39,7]     w[40,7]
##  319.657564  720.274059  505.835473 1118.424848 1000.000000  676.753790
##     w[41,7]     w[42,7]     w[43,7]     w[44,7]     w[45,7]     w[46,7]
##  737.156028  912.145584  728.094393 1000.000000 1000.000000  888.735027
##     w[47,7]     w[48,7]     w[49,7]     w[50,7]      w[1,8]      w[2,8]
## 1000.000000 1000.000000  898.165947 1000.000000 1000.000000 1000.000000
##      w[3,8]      w[4,8]      w[5,8]      w[6,8]      w[7,8]      w[8,8]
##  979.293821 1066.417435  826.826491 1000.000000 1000.000000 1000.000000
##      w[9,8]     w[10,8]     w[11,8]     w[12,8]     w[13,8]     w[14,8]
## 1000.000000 1107.483829 1000.000000 1000.000000 1000.000000 1000.000000
##     w[15,8]     w[16,8]     w[17,8]     w[18,8]     w[19,8]     w[20,8]
## 1000.000000  879.247518  881.393432 1000.000000  886.219529 1000.000000
##     w[21,8]     w[22,8]     w[23,8]     w[24,8]     w[25,8]     w[26,8]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1139.977434
##     w[27,8]     w[28,8]     w[29,8]     w[30,8]     w[31,8]     w[32,8]
##  960.501592 1000.000000 1000.000000 1000.000000  904.101000 1247.344348
##     w[33,8]     w[34,8]     w[35,8]     w[36,8]     w[37,8]     w[38,8]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1200.709570
##     w[39,8]     w[40,8]     w[41,8]     w[42,8]     w[43,8]     w[44,8]
```

```
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[45,8]     w[46,8]     w[47,8]     w[48,8]     w[49,8]     w[50,8]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000  585.986061
##      w[1,9]      w[2,9]      w[3,9]      w[4,9]      w[5,9]      w[6,9]
## 1000.000000  870.412732 1000.000000 1000.000000  864.768900 1000.000000
##      w[7,9]      w[8,9]      w[9,9]     w[10,9]     w[11,9]     w[12,9]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[13,9]     w[14,9]     w[15,9]     w[16,9]     w[17,9]     w[18,9]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1102.884663
##     w[19,9]     w[20,9]     w[21,9]     w[22,9]     w[23,9]     w[24,9]
## 1000.000000 1000.000000 1000.000000  904.911139 1000.000000 1000.000000
##     w[25,9]     w[26,9]     w[27,9]     w[28,9]     w[29,9]     w[30,9]
## 1000.000000 1003.239618  906.824196 1000.000000 1000.000000 1107.168204
##     w[31,9]     w[32,9]     w[33,9]     w[34,9]     w[35,9]     w[36,9]
## 1000.000000 1181.678456 1000.000000 1000.000000 1147.436697  913.623080
##     w[37,9]     w[38,9]     w[39,9]     w[40,9]     w[41,9]     w[42,9]
## 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000 1000.000000
##     w[43,9]     w[44,9]     w[45,9]     w[46,9]     w[47,9]     w[48,9]
## 1000.000000 1000.000000 1000.000000  941.271619 1101.778601 1198.995061
##     w[49,9]     w[50,9]     w[1,10]     w[2,10]     w[3,10]     w[4,10]
##  949.625362 1000.000000 1417.284827  861.697255 1000.000000  849.805903
##     w[5,10]     w[6,10]     w[7,10]     w[8,10]     w[9,10]    w[10,10]
##  776.171056 1000.000000  848.574652 1000.000000  310.350469 1000.000000
##    w[11,10]    w[12,10]    w[13,10]    w[14,10]    w[15,10]    w[16,10]
## 1119.430214  867.019148 1000.000000 1000.000000  930.293484  468.138696
##    w[17,10]    w[18,10]    w[19,10]    w[20,10]    w[21,10]    w[22,10]
## 1107.009652 1000.000000 1000.000000  895.622533 1000.000000 1120.612349
##    w[23,10]    w[24,10]    w[25,10]    w[26,10]    w[27,10]    w[28,10]
## 1000.000000 1000.000000  805.963748 1000.000000 1000.000000 1000.000000
##    w[29,10]    w[30,10]    w[31,10]    w[32,10]    w[33,10]    w[34,10]
## 1000.000000  912.676780  389.847444  959.668727 1000.000000 1000.000000
##    w[35,10]    w[36,10]    w[37,10]    w[38,10]    w[39,10]    w[40,10]
## 1321.882591  776.026285 1000.000000 1000.000000 1000.000000 1000.000000
##    w[41,10]    w[42,10]    w[43,10]    w[44,10]    w[45,10]    w[46,10]
## 1090.190763 1000.000000  891.253595  612.563698 1000.000000 1000.000000
##    w[47,10]    w[48,10]    w[49,10]    w[50,10]        z[1]        z[2]
## 1000.000000 1000.000000 1000.000000 1000.000000    0.000000    9.542767
##        z[3]        z[4]        z[5]        z[6]        z[7]        z[8]
##    0.000000    9.365488    9.365488 1000.000000    0.000000    9.365488
##        z[9]       z[10]       z[11]       z[12]       z[13]       z[14]
##   23.697591    0.000000    0.000000    9.542767    9.542767    9.542767
##       z[15]       z[16]       z[17]       z[18]       z[19]       z[20]
##    9.365488    0.000000    0.000000    0.000000    9.365488    9.542767
##       z[21]       z[22]       z[23]       z[24]       z[25]       z[26]
##    9.365488    9.542767    9.365488    9.365488    0.000000    9.194737
##       z[27]       z[28]       z[29]       z[30]       z[31]       z[32]
##    0.000000    9.542767    0.000000    9.726953    0.000000    9.542767
##       z[33]       z[34]       z[35]       z[36]       z[37]       z[38]
##    0.000000    9.918458   16.048412   10.117723    0.000000    9.542767
##       z[39]       z[40]       z[41]       z[42]       z[43]       z[44]
##    9.365488    0.000000    9.542767    9.542767    0.000000    9.365488
##       z[45]       z[46]       z[47]       z[48]       z[49]       z[50]
##    9.542767    9.365488    0.000000    0.000000    0.000000    0.000000
```

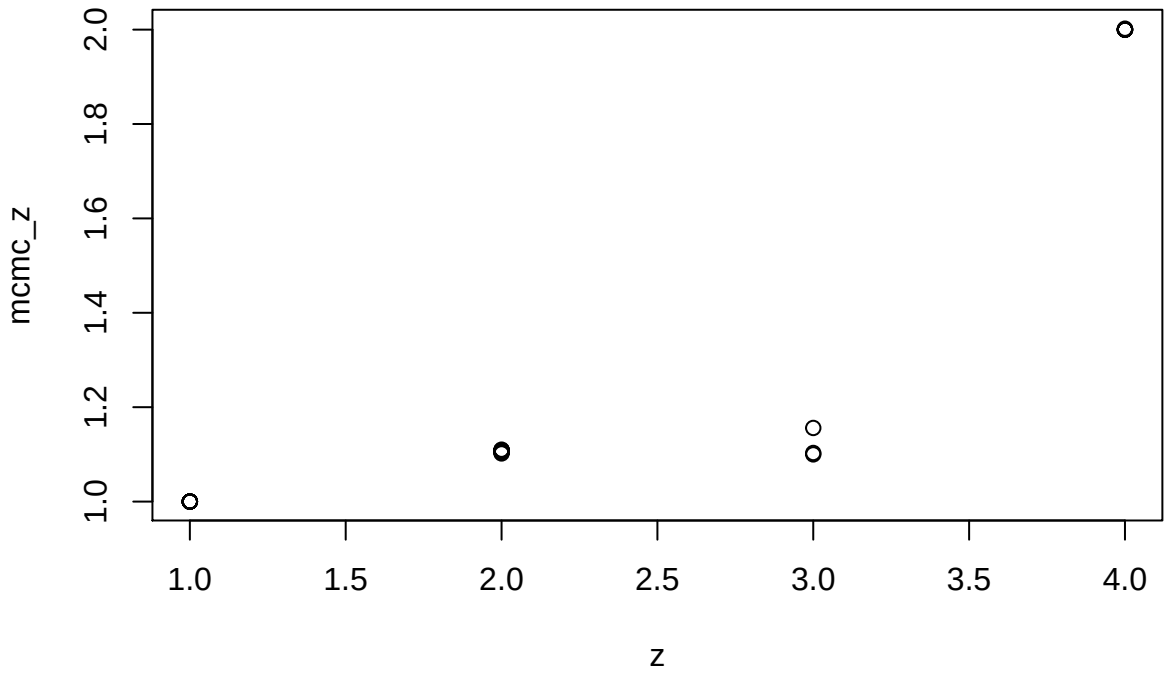
```
pdf(file.path(trace.dir, paste0(runName, "_trace.pdf")))
plot(samps)
dev.off()
```

```
## pdf
##   2
```

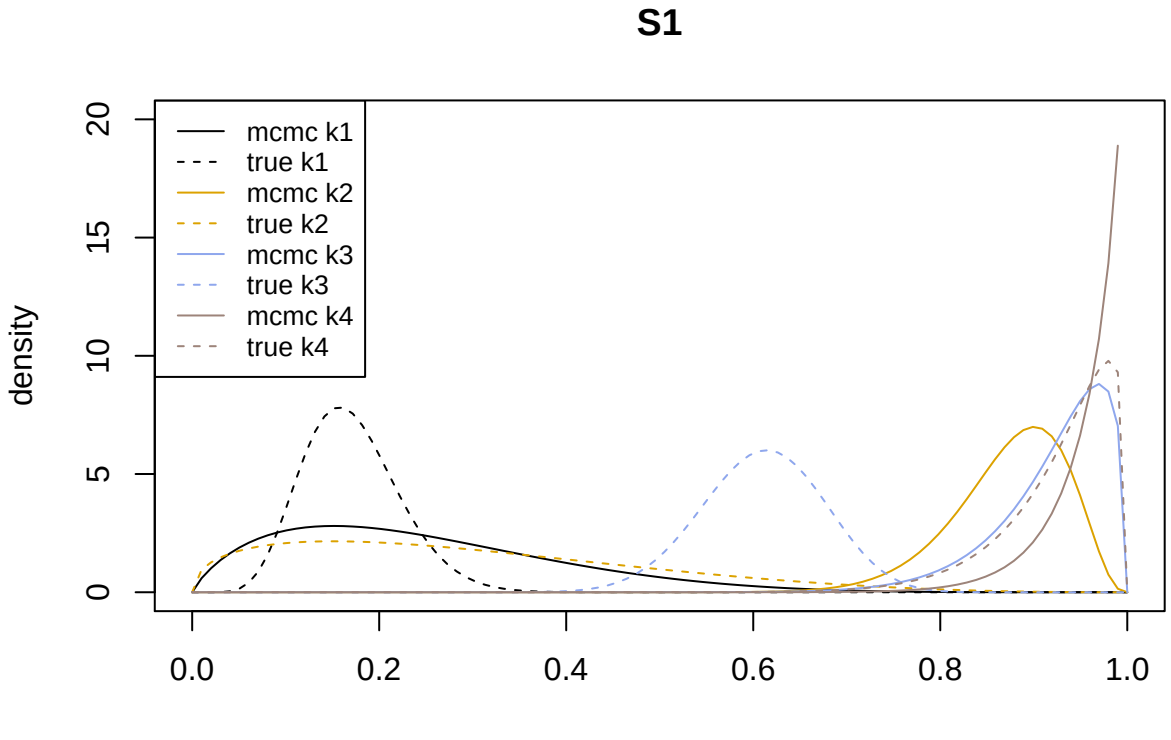
```
mcmc_vals <- s$statistics
mcmc_w <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "w", "Mean"]
plot(as.vector(w), mcmc_w, type = "p")
abline(a=0, b=1)
```

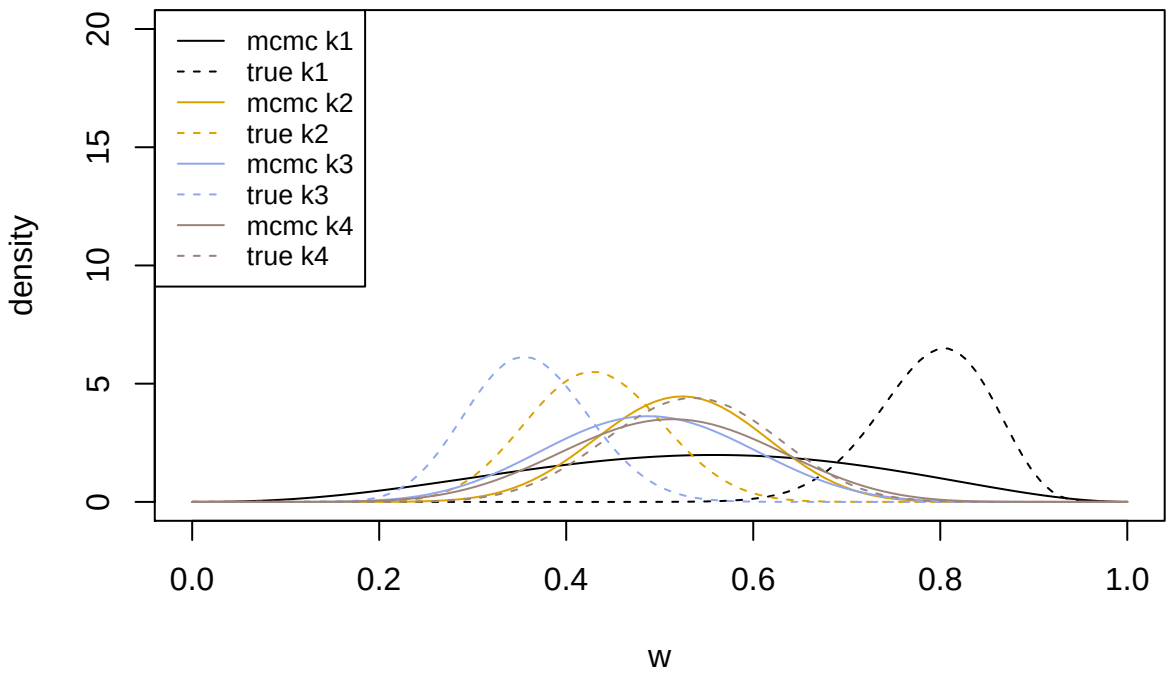


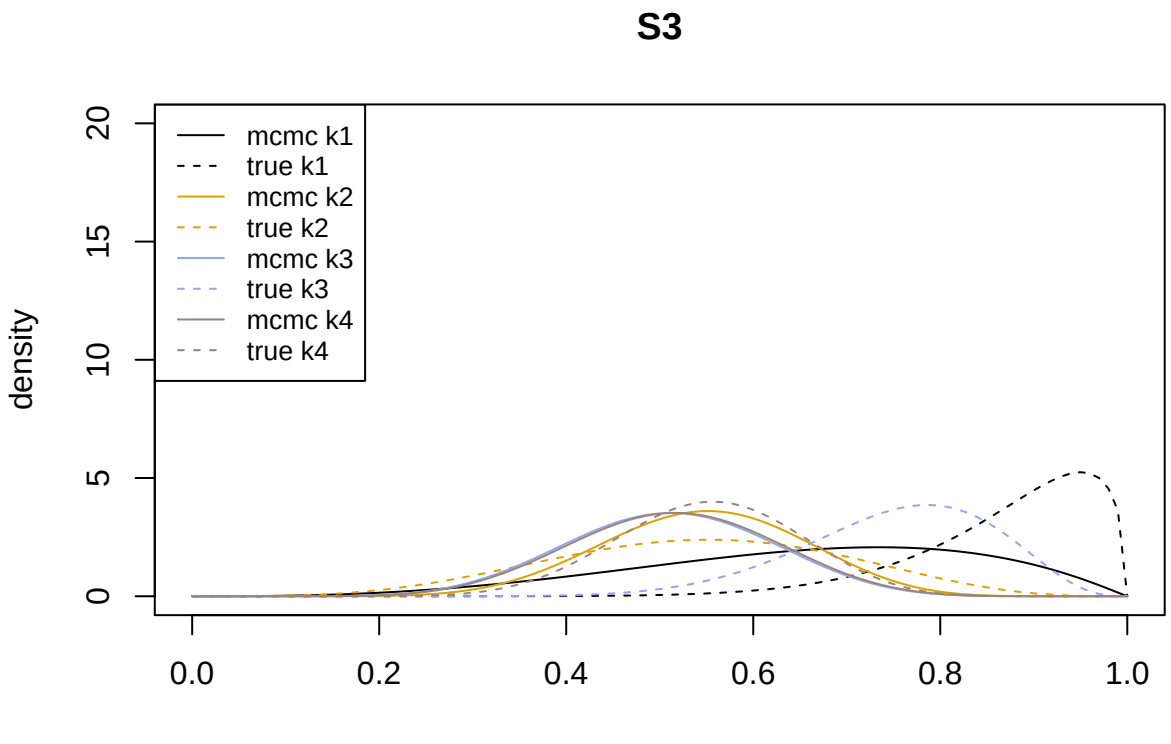

```
mcmc_z <- as.vector(mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "z", "Mean"])
#mcmc_z <- round(mcmc_z, 0)
plot(z, mcmc_z, type = "p")
```

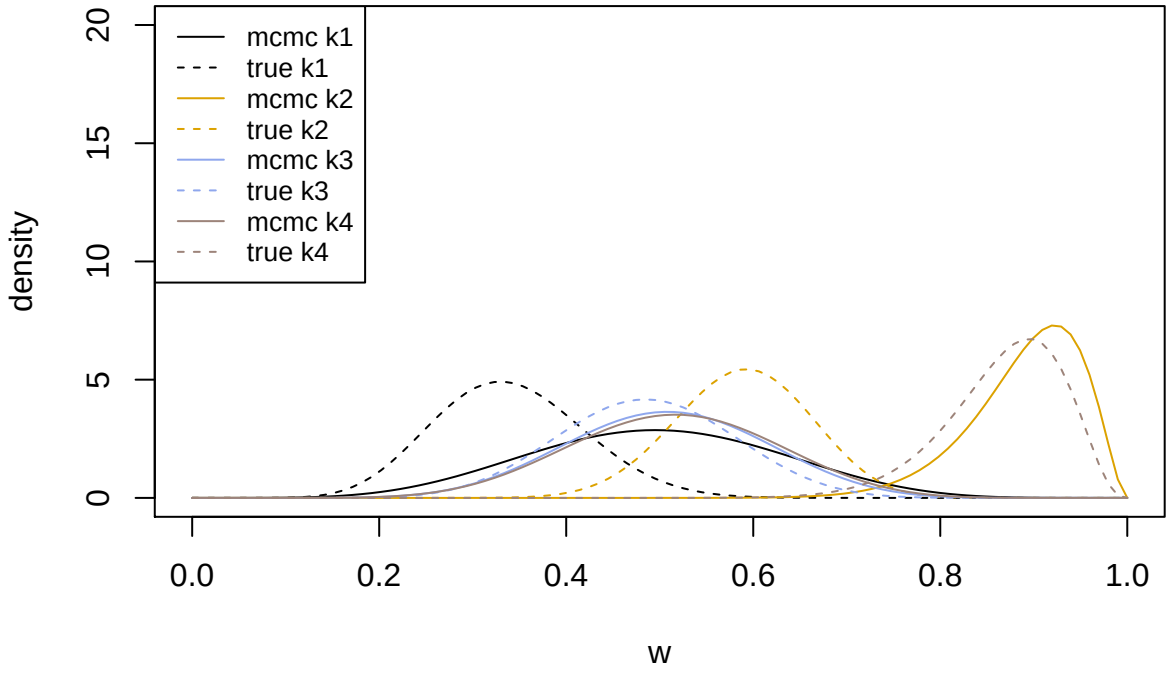


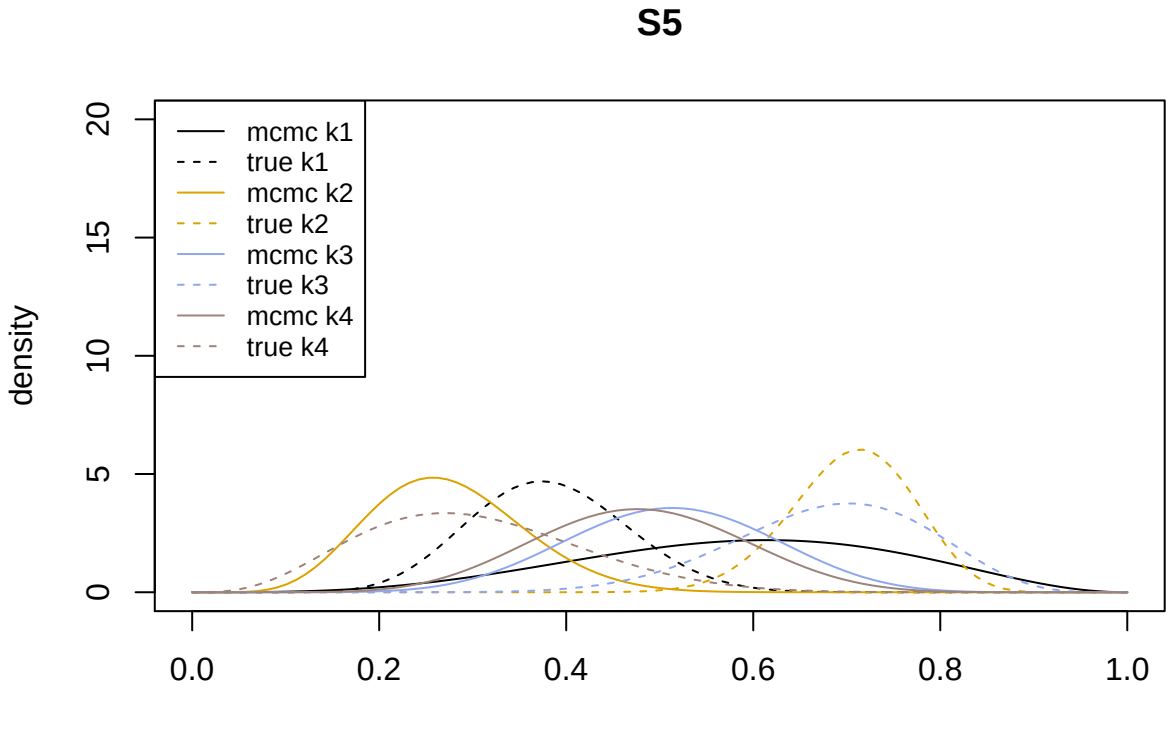

```
mcmc_U <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "U", "Mean"]
mcmc_U <- matrix(mcmc_U, nrow=K)
mcmc_V <- mcmc_vals[substr(rownames(mcmc_vals), 1, 1) == "V", "Mean"]
mcmc_V <- matrix(mcmc_V, nrow=K)

p <- seq(0, 1, length = 100)
colors <- c("#000000", "#DCA200", "#8FA7ED", "#9D847A", "#A47901")
for (s in 1:S) {
  for (k in 1:K) {
    if (k == 1) {
      # plot mcmc mean U,V
      plot(p, dbeta(p, mcmc_U[k,s] * mcmc_V[k,s], (1-mcmc_U[k,s])*mcmc_V[k,s]),
           main = paste0("S", s),
           ylab = "density", xlab = "w", type = "l", col = colors[k],
           ylim = c(0, 20))
      # plot truth
      lines(p, dbeta(p, a.ordered[k,s], b.ordered[k,s]), type = "l", col = colors[k], lty=2)
      # add legend
      legend(x = "topleft",
             legend = paste0(c("mcmc k", "true k"), rep(1:K, each=2)),
             col = colors[rep(1:K, each=2)],
             lty = rep(1:2, K),
             cex=0.8)
    } else {
      # plot mcmc mean U,V
      lines(p, dbeta(p, mcmc_U[k,s] * mcmc_V[k,s], (1-mcmc_U[k,s])*mcmc_V[k,s]),
            type = "l", col = colors[k])
      # plot truth
      lines(p, dbeta(p, a.ordered[k,s], b.ordered[k,s]), type = "l", col = colors[k], lty=2)
    }
  }
}
```

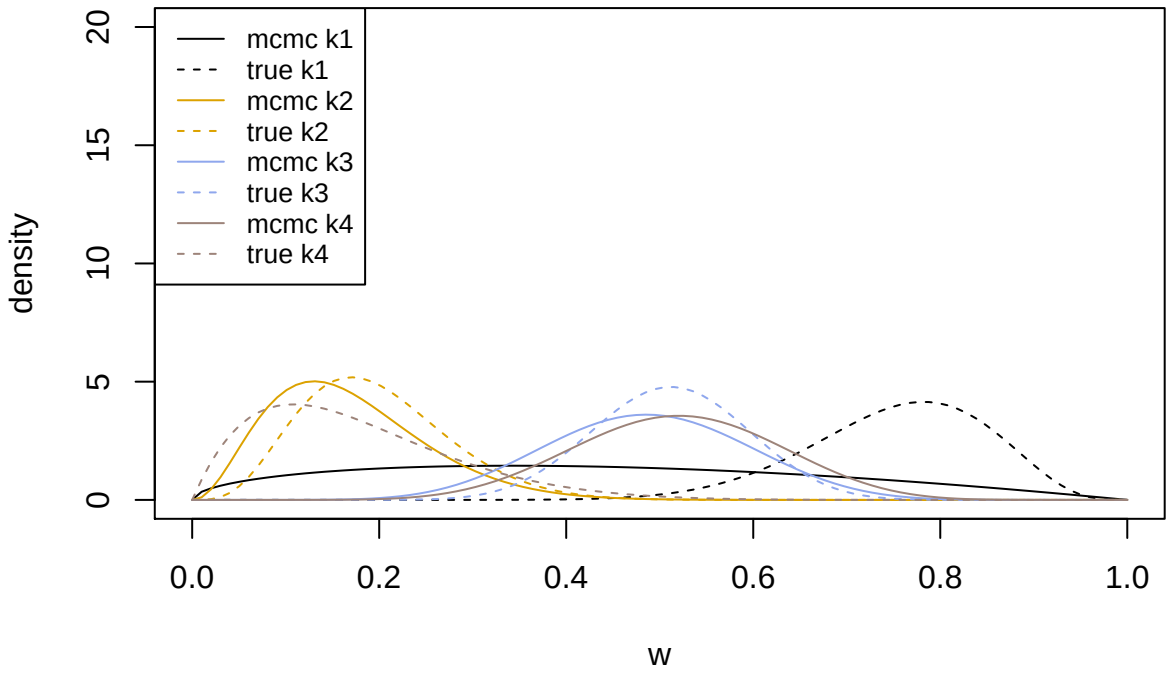

S1
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w

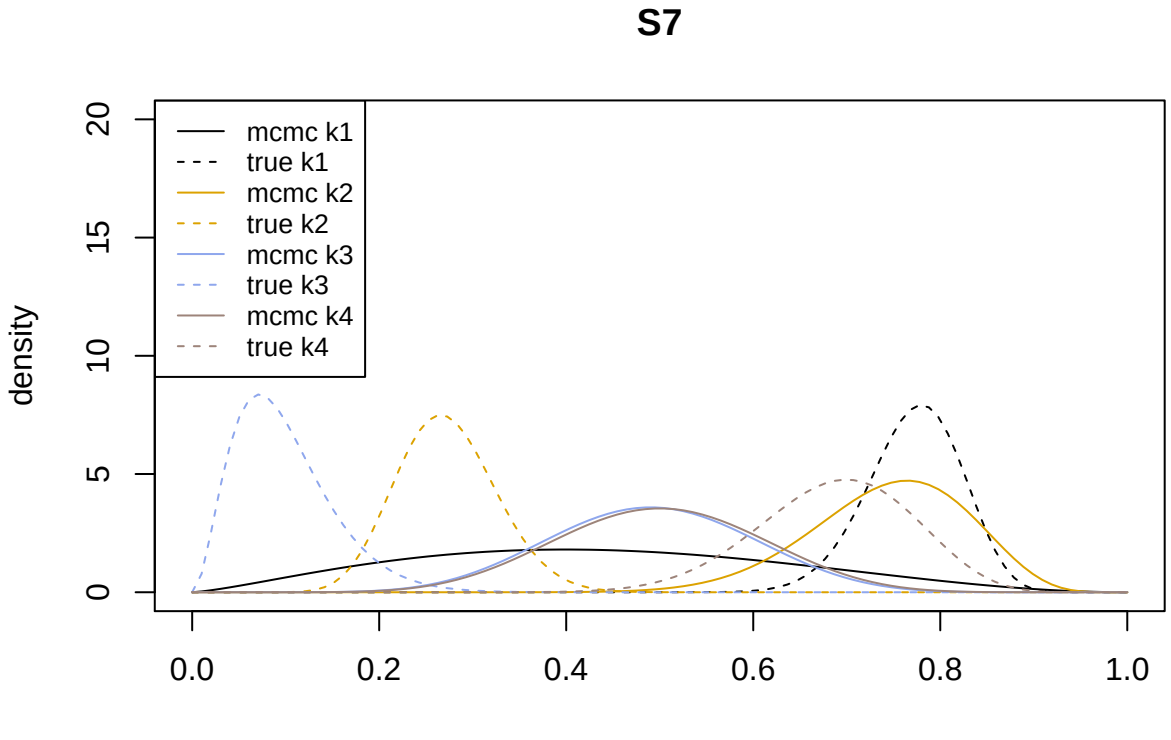

S2
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w

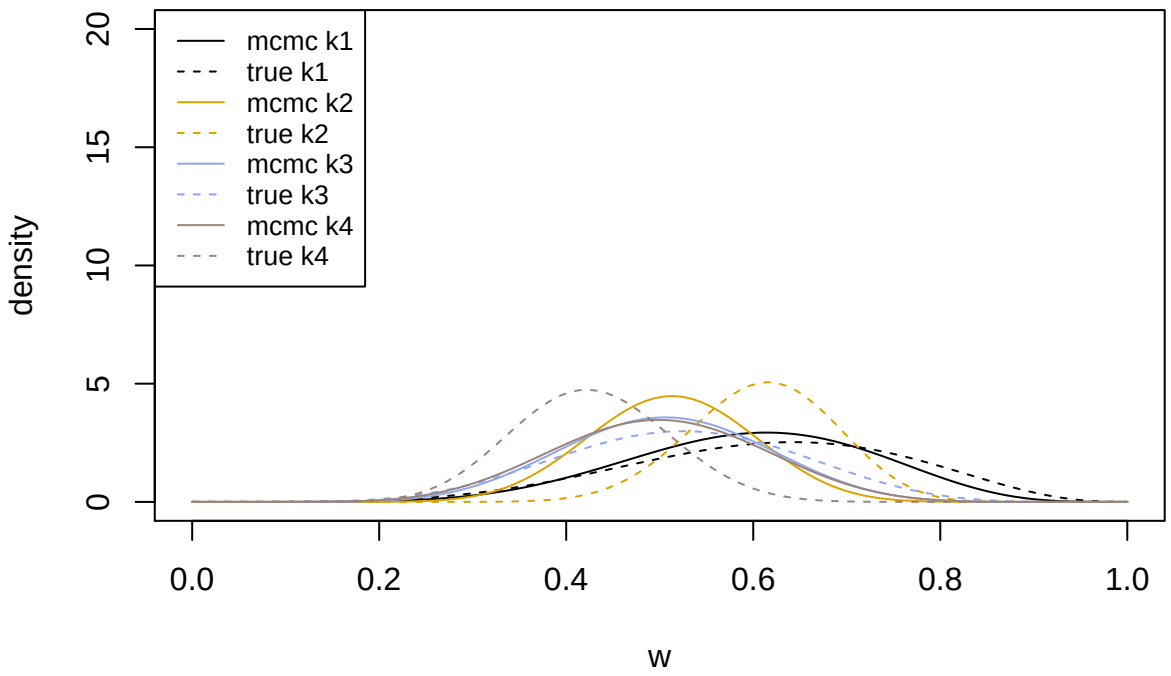

S3
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w

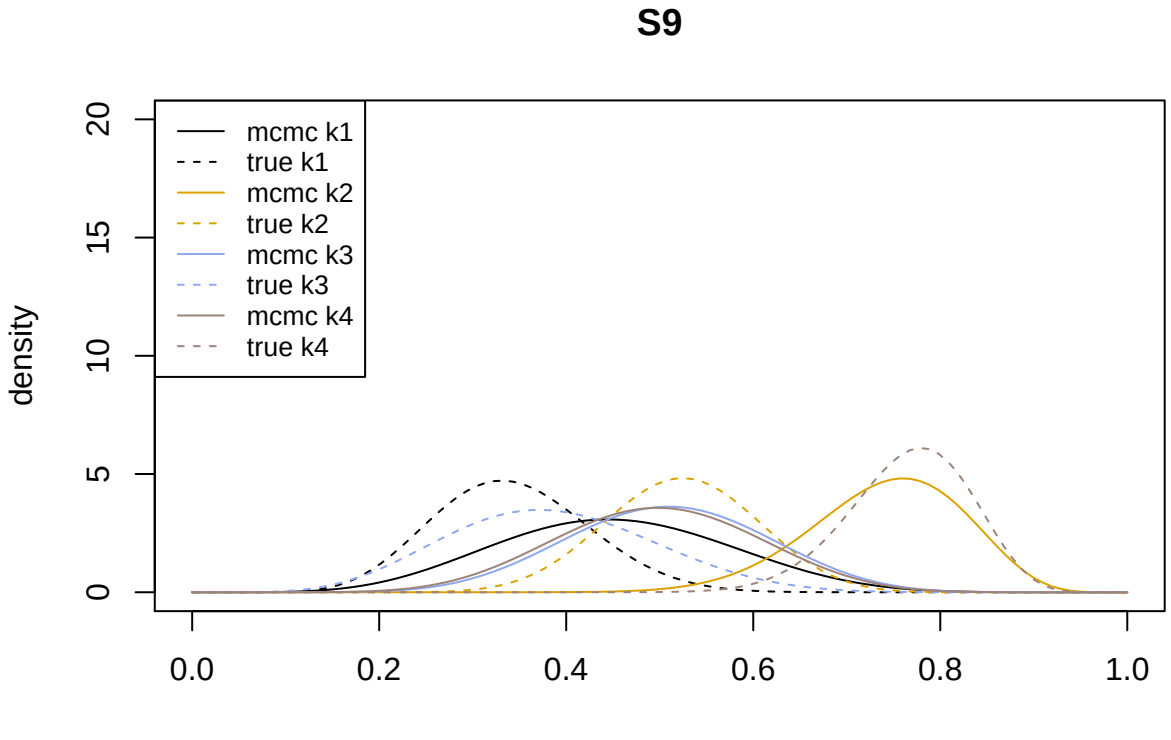

S4
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w

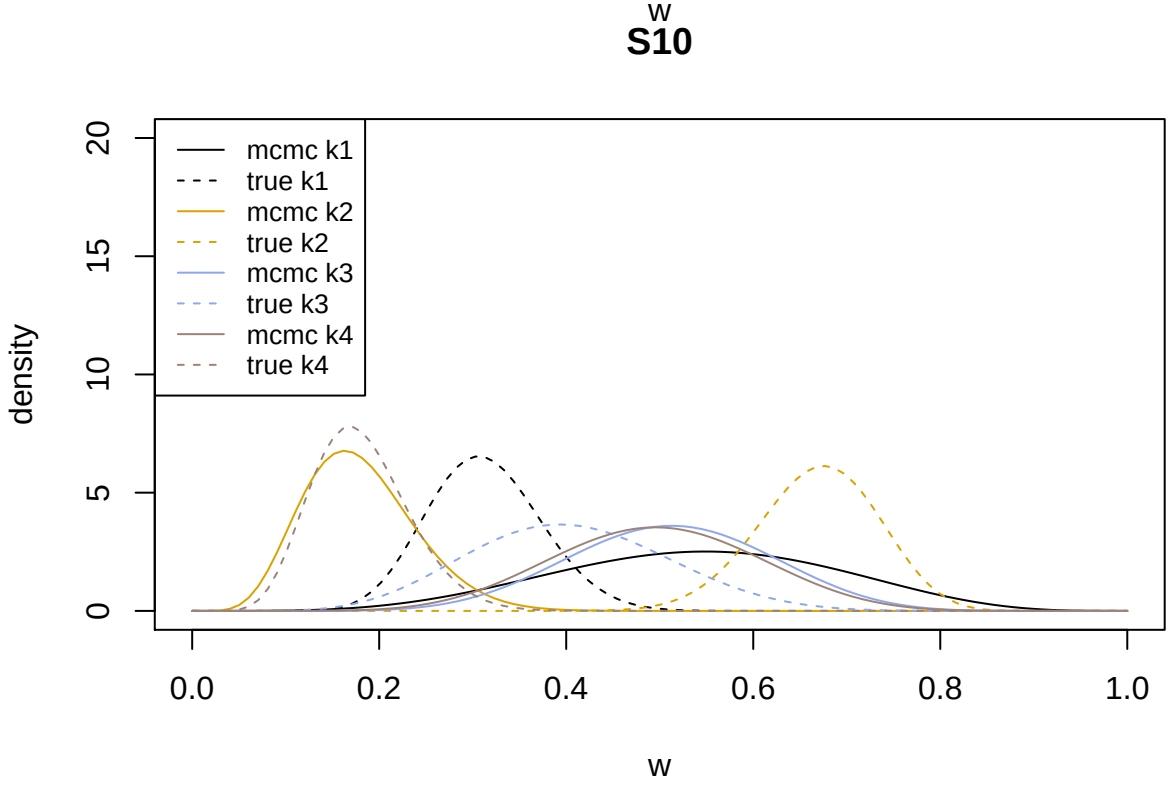

S5
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w


S6
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w


S7
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w


S8
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w


S9
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w


S10
mcmc k1
true k1
mcmc k2
true k2
mcmc k3
true k3
mcmc k4
true k4
density
0
5
10
15
20
0.0
0.2
0.4
0.6
0.8
1.0
w