

```
## Load libraries
library(splines)
library(MASS)
library(qvalue)

##source functions
source("../functions.R")
```

# 1 Degree = 1

## 1.1 Normally-distributed test statistics

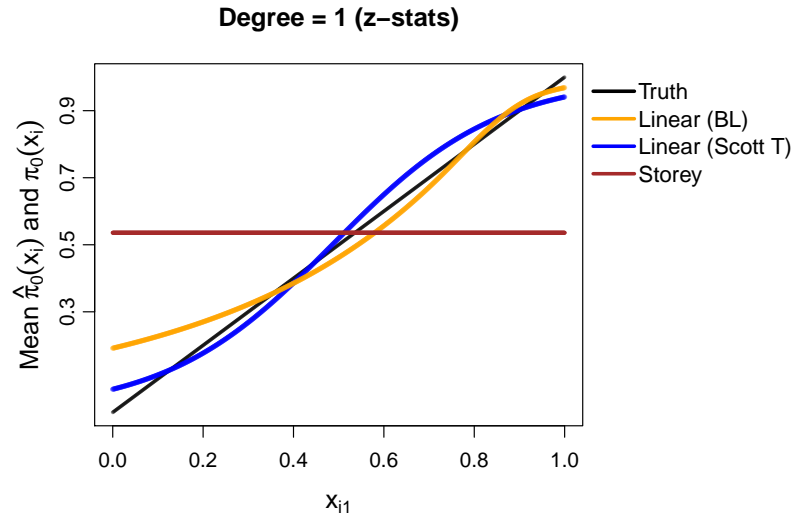
```
alts <- c("alt_z_large", "alt_t_large")

alt <- alts[1]

load(paste(alt, "simResults_5.RData", sep="/"))
load(paste(alt, "simResults_pi0x_thresh_5.RData", sep="/"))
load(paste(alt, "simResults_pi0x_Scott_emp_5.RData", sep="/"))
load(paste(alt, "simResults_pi0x_Scott_5.RData", sep="/"))

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, pi0StoreyMean, tme=tme, main=
  ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
  legend=c("Truth",
    "Linear (BL)",
    "Linear (Scott T)",
    "Storey"),
  col=c("black",
    "orange",
    "blue",
    "brown"),
  bty="n",
  lwd=c(3,3,3,3), lty=c(1,1,1,1),
  cex=1.2, x.intersp=0.2, y.intersp=1.0)
```



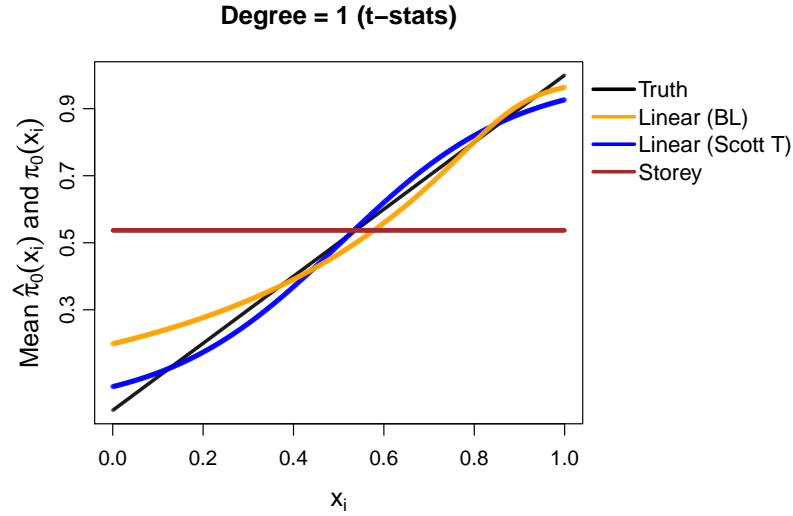
## 1.2 T-distributed test statistics

```
alt <- alts[2]

load(paste(alt, "simResults_5.RData", sep="/"))
load(paste(alt, "simResults_pi0x_thresh_5.RData", sep="/"))
load(paste(alt, "simResults_pi0x_Scott_emp_5.RData", sep="/"))
load(paste(alt, "simResults_pi0x_Scott_5.RData", sep="/"))

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, tme=tme, main="Degree = 1 (t",
            ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
      legend=c("Truth",
                "Linear (BL)",
                "Linear (Scott T)",
                "Storey"),
      col=c("black",
            "orange",
            "blue",
            "brown"),
      bty="n",
      lwd=c(3,3,3,3), lty=c(1,1,1,1),
      cex=1.2, x.intersp=0.2, y.intersp=1.0)
```



## 2 Degree = 1.25

### 2.1 Normally-distributed test statistics

```
alts <- c("alt_z_large", "alt_t_large")

alt <- alts[1]

load(paste(alt, "simResults_9.RData", sep="/"))
load(paste(alt, "simResults_pi0x_thresh_9.RData", sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

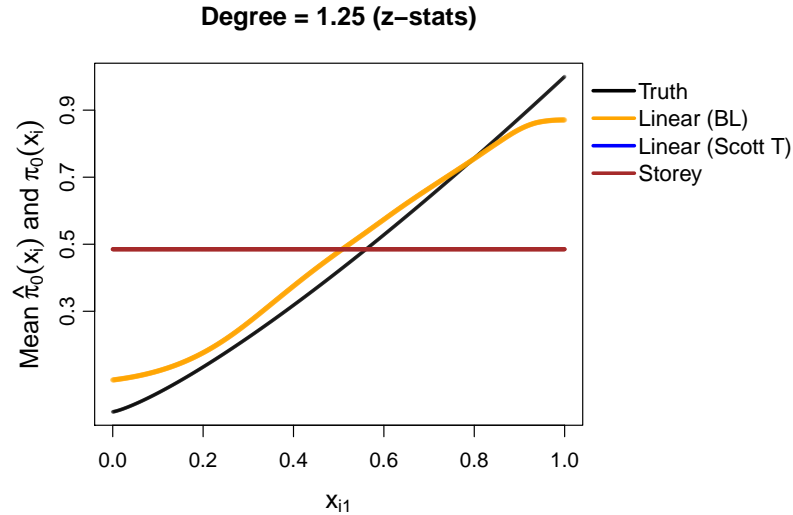
pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, pi0StoreyMean, tme=tme, main=
  ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
  legend=c("Truth",
    "Linear (BL)",
    "Linear (Scott T)",
    "Storey"),
  col=c("black",
    "orange",
    "blue",
```

```

    "brown"),
    bty="n",
    lwd=c(3,3,3,3), lty=c(1,1,1,1),
    cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



## 2.2 T-distributed test statistics

```

alt <- alts[2]

load(paste(alt,"simResults_9.RData",sep="/"))
load(paste(alt,"simResults_pi0x_thresh_9.RData",sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

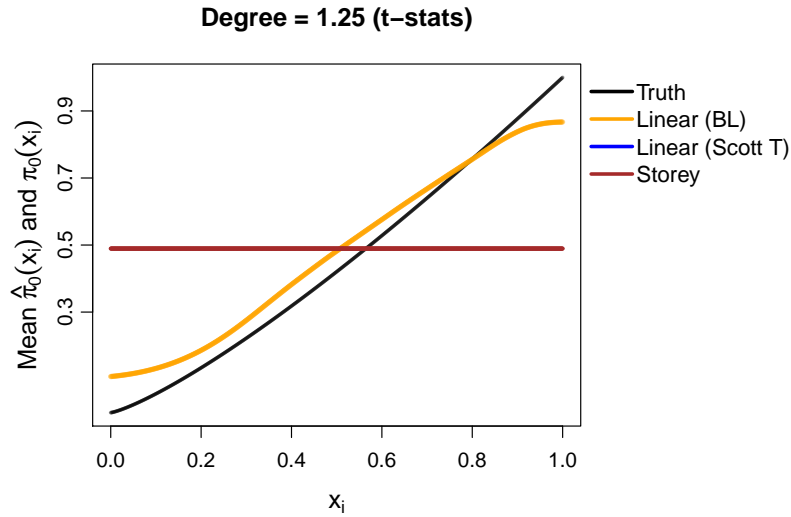
plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, tme=tme, main="Degree = 1.25",
  ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
  legend=c("Truth",
    "Linear (BL)",
    "Linear (Scott T)",
    "Storey"),
  col=c("black",
    "orange",

```

```

"blue",
"brown"),
bty="n",
lwd=c(3,3,3,3), lty=c(1,1,1,1),
cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



### 3 Degree = 1.5

#### 3.1 Normally-distributed test statistics

```

alts <- c("alt_z_large", "alt_t_large")

alt <- alts[1]

load(paste(alt, "simResults_10.RData", sep="/"))
load(paste(alt, "simResults_pi0x_thresh_10.RData", sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

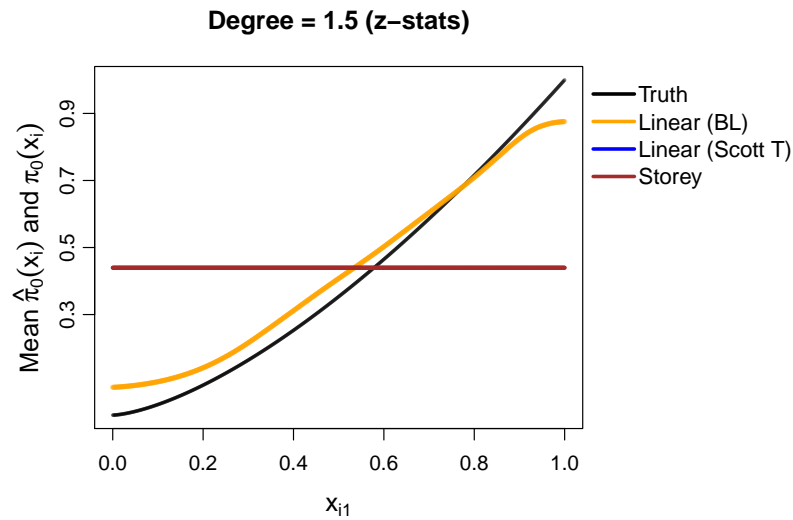
plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, pi0StoreyMean, tme=tme, main=
  ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
  legend=c("Truth",

```

```

      "Linear (BL)",
      "Linear (Scott T)",
      "Storey"),
  col=c("black",
        "orange",
        "blue",
        "brown"),
  bty="n",
  lwd=c(3,3,3,3), lty=c(1,1,1,1),
  cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



### 3.2 T-distributed test statistics

```

alt <- alts[2]

load(paste(alt, "simResults_10.RData", sep="/"))
load(paste(alt, "simResults_pi0x_thresh_10.RData", sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

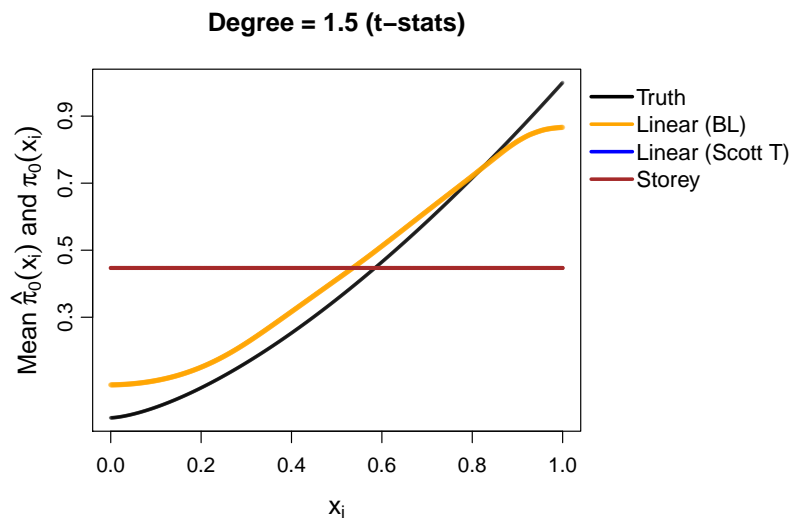
plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, tme=tme, main="Degree = 1.5 (z-stats)",
  ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,

```

```

legend=c("Truth",
         "Linear (BL)",
         "Linear (Scott T)",
         "Storey"),
col=c("black",
      "orange",
      "blue",
      "brown"),
bty="n",
lwd=c(3,3,3,3), lty=c(1,1,1,1),
cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



## 4 Degree = 2

### 4.1 Normally-distributed test statistics

```

alts <- c("alt_z_large", "alt_t_large")

alt <- alts[1]

load(paste(alt, "simResults_11.RData", sep="/"))
load(paste(alt, "simResults_pi0x_thresh_11.RData", sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

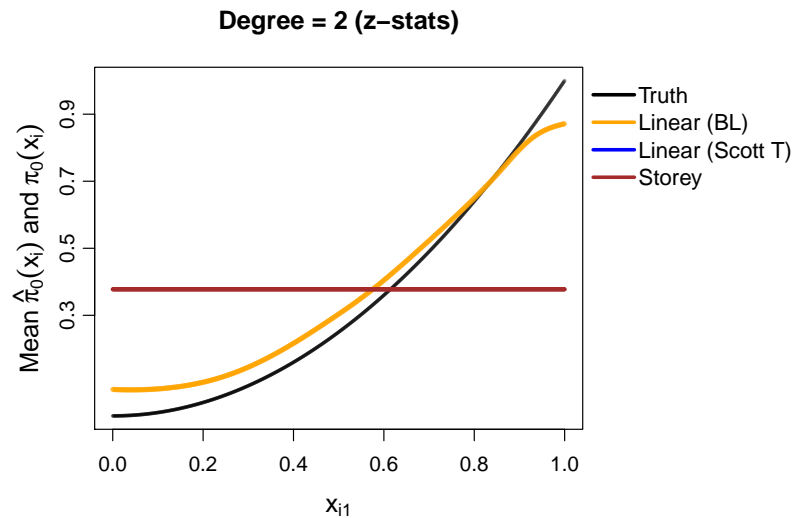
```

```

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, pi0StoreyMean, tme=tme, main=
  ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
  legend=c("Truth",
    "Linear (BL)",
    "Linear (Scott T)",
    "Storey"),
  col=c("black",
    "orange",
    "blue",
    "brown"),
  bty="n",
  lwd=c(3,3,3,3), lty=c(1,1,1,1),
  cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



## 4.2 T-distributed test statistics

```

alt <- alts[2]

load(paste(alt, "simResults_11.RData", sep="/"))
load(paste(alt, "simResults_pi0x_thresh_11.RData", sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

```

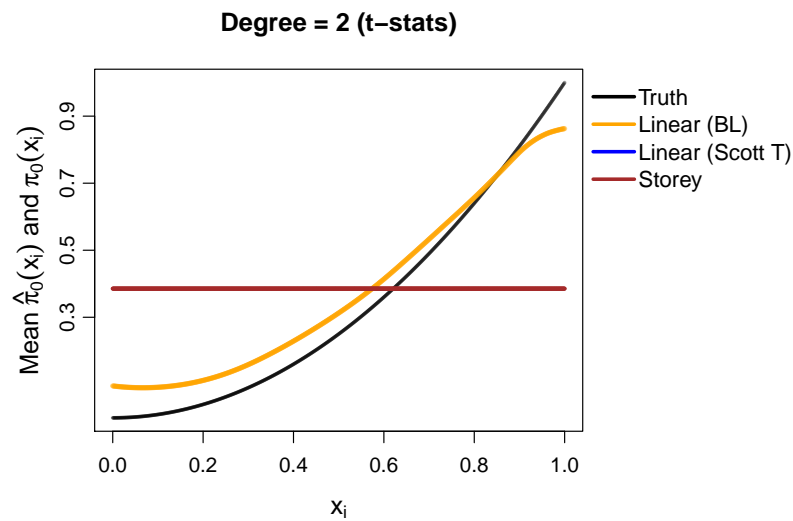


```

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, tme=tme, main="Degree = 2 (t-
            ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
      legend=c("Truth",
                "Linear (BL)",
                "Linear (Scott T)",
                "Storey"),
      col=c("black",
            "orange",
            "blue",
            "brown"),
      bty="n",
      lwd=c(3,3,3,3), lty=c(1,1,1,1),
      cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



## 5 Degree = 3

### 5.1 Normally-distributed test statistics

```

alts <- c("alt_z_large", "alt_t_large")

alt <- alts[1]

```

```

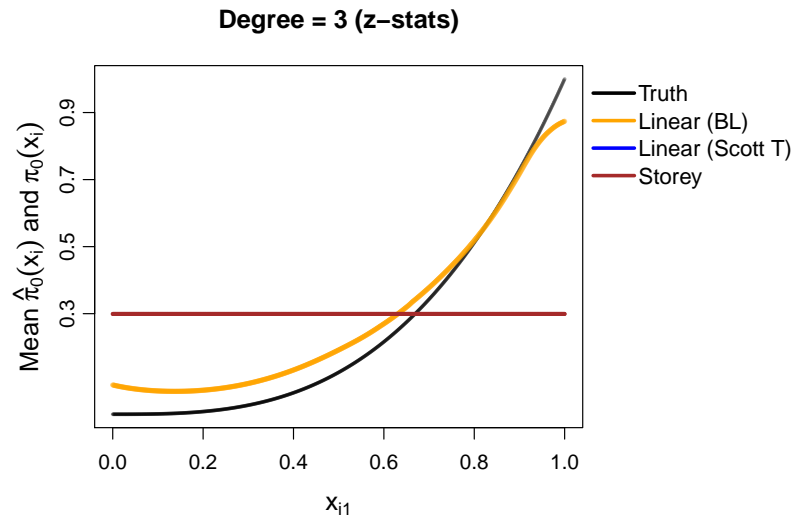
load(paste(alt,"simResults_12.RData",sep="/"))
load(paste(alt,"simResults_pi0x_thresh_12.RData",sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, pi0StoreyMean, tme=tme, main=
  ylim=c(0,1))
legend("topright", inset=c(-0.45,0), ##x=-0.2, y=0.45, ##"bottomright", ##x=-100, y=0.3,
  legend=c("Truth",
    "Linear (BL)",
    "Linear (Scott T)",
    "Storey"),
  col=c("black",
    "orange",
    "blue",
    "brown"),
  bty="n",
  lwd=c(3,3,3,3), lty=c(1,1,1,1),
  cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



## 5.2 T-distributed test statistics

```

alt <- alts[2]

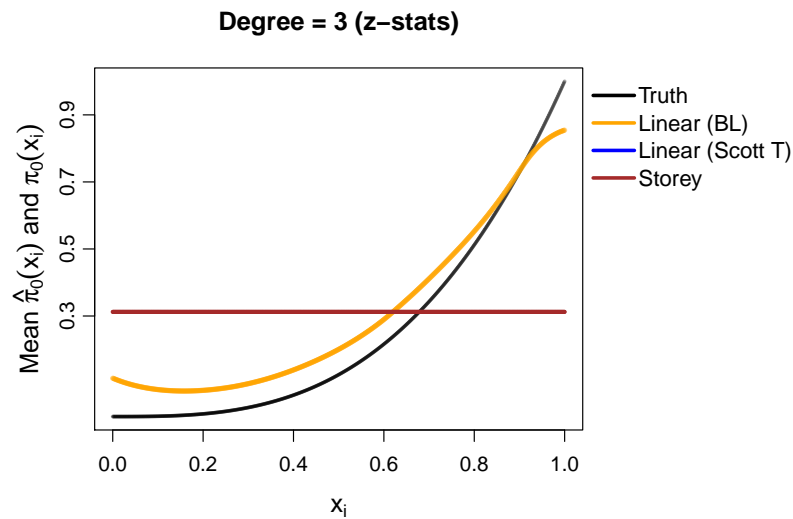
load(paste(alt,"simResults_12.RData",sep="/"))
load(paste(alt,"simResults_pi0x_thresh_12.RData",sep="/"))

pi0hatScottMean <- rep(NA, length(pi0))

pi0StoreyMean <- mean(apply(pValuesSims, 1, function(p){qvalue(p)$pi0}))

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, tme=tme, main="Degree = 3 (z-
      ylim=c(0,1))
legend("topright", inset=c(-0.45,0),##x=-0.2, y=0.45,##"bottomright", ##x=-100, y=0.3,
      legend=c("Truth",
                "Linear (BL)",
                "Linear (Scott T)",
                "Storey"),
      col=c("black",
            "orange",
            "blue",
            "brown"),
      bty="n",
      lwd=c(3,3,3,3), lty=c(1,1,1,1),
      cex=1.2, x.intersp=0.2, y.intersp=1.0)

```



Session info:

```

devtools::session_info()

## Session info -----
## setting value
## version R version 3.3.1 (2016-06-21)
## system x86_64, mingw32
## ui RTerm
## language (EN)
## collate English_United States.1252
## tz America/New_York
## date 2018-09-06

## Packages -----
## package * version date source
## colorspace 1.2-6 2015-03-11 CRAN (R 3.3.1)
## devtools 1.12.0 2016-06-24 CRAN (R 3.3.3)
## digest 0.6.12 2017-01-27 CRAN (R 3.3.3)
## evaluate 0.10 2016-10-11 CRAN (R 3.3.1)
## ggplot2 2.2.1 2016-12-30 CRAN (R 3.3.3)
## gtable 0.2.0 2016-02-26 CRAN (R 3.3.1)
## highr 0.6 2016-05-09 CRAN (R 3.3.1)
## knitr * 1.17 2017-08-10 CRAN (R 3.3.3)
## lazyeval 0.2.0 2016-06-12 CRAN (R 3.3.1)
## magrittr 1.5 2014-11-22 CRAN (R 3.3.1)
## MASS * 7.3-45 2016-04-21 CRAN (R 3.3.1)
## memoise 1.0.0 2016-01-29 CRAN (R 3.3.1)
## munsell 0.4.3 2016-02-13 CRAN (R 3.3.1)
## plyr 1.8.4 2016-06-08 CRAN (R 3.3.1)
## qvalue * 2.4.2 2016-05-16 Bioconductor
## Rcpp 0.12.13 2017-09-28 CRAN (R 3.3.3)
## reshape2 1.4.1 2014-12-06 CRAN (R 3.3.1)
## rlang 0.1.4 2017-11-05 CRAN (R 3.3.3)
## scales 0.4.1 2016-11-09 CRAN (R 3.3.3)
## stringi 1.1.1 2016-05-27 CRAN (R 3.3.0)
## stringr 1.2.0 2017-02-18 CRAN (R 3.3.3)
## tibble 1.3.3 2017-05-28 CRAN (R 3.3.3)
## withr 1.0.2 2016-06-20 CRAN (R 3.3.1)

```