

```

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

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

```

1 Normally-distributed test statistics

```

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

alt <- alts[1]

print("I")

## [1] "I"

load(paste(alt,"simResults_1.RData",sep="/"))
load(paste(alt,"simResults_pi0x_thresh_1.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_emp_1.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_1.RData",sep="/"))

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

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, pi0StoreyMean, tme=tme, main=
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)

#####
# print("II")

## [1] "II"

```

```

load(paste(alternative,"simResults_2.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_thresh_2.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_emp_2.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_2.RData",sep="/"))

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

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, tme=tme, main="I")
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)

plotMeanPi0(pi0, pi0Spl.MeansVars, pi0hatSpl.ScottMean, pi0StoreyMean, tme=tme, main="II")
legend("topright", inset=c(-0.7,0),##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)

#####
#III#
print("III")
## [1] "III"

load(paste(alternative,"simResults_3.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_thresh_3.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_emp_3.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_3.RData",sep="/"))

```

```

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

plotMeanPi0(pi0, pi0Lin.MeansVars, pi0hatLin.ScottMean, pi0StoreyMean, tme=tme, main="III")
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)

plotMeanPi0(pi0, pi0Spl.MeansVars, pi0hatSpl.ScottMean, pi0StoreyMean, tme=tme, main="III")
legend("topright", inset=c(-0.7,0),##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)

#####
# IV

print("IV")
## [1] "IV"

load(paste(alt,"simResults_4.RData",sep="/"))
load(paste(alt,"simResults_pi0x_thresh_4.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_emp_4.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_4.RData",sep="/"))

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

plotMeanPi0(pi0, pi0Lin.MeansVars, pi0hatLin.ScottMean, pi0StoreyMean, tme=tme, main="IV")
legend("topright", inset=c(-0.45,0),##x=-0.2, y=0.45,##"bottomright", ##x=-100, y=0.3,
       legend=c("Truth",

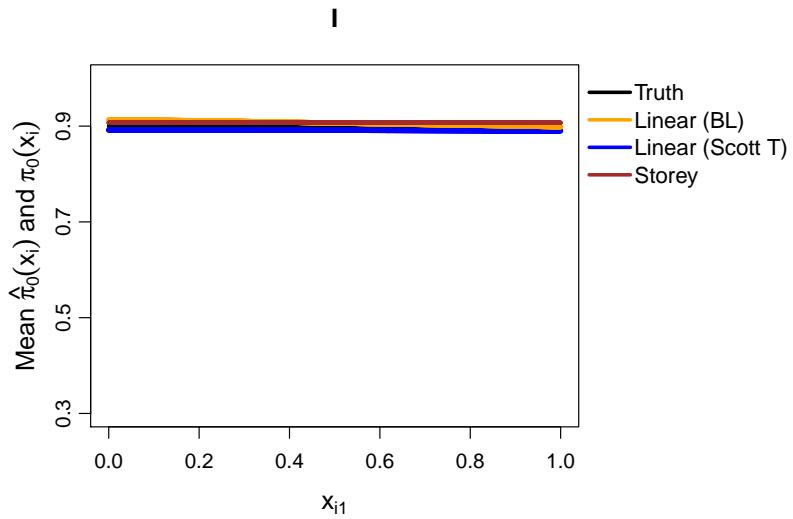
```

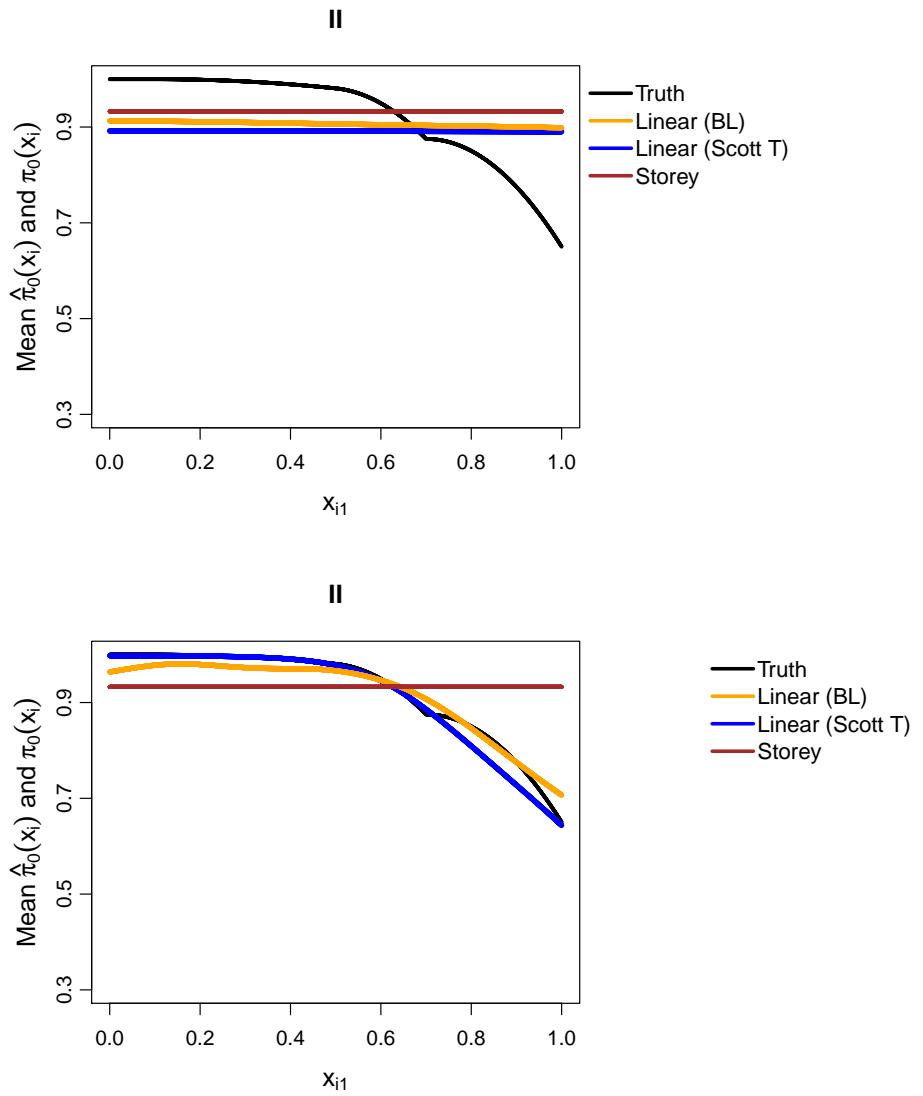
```

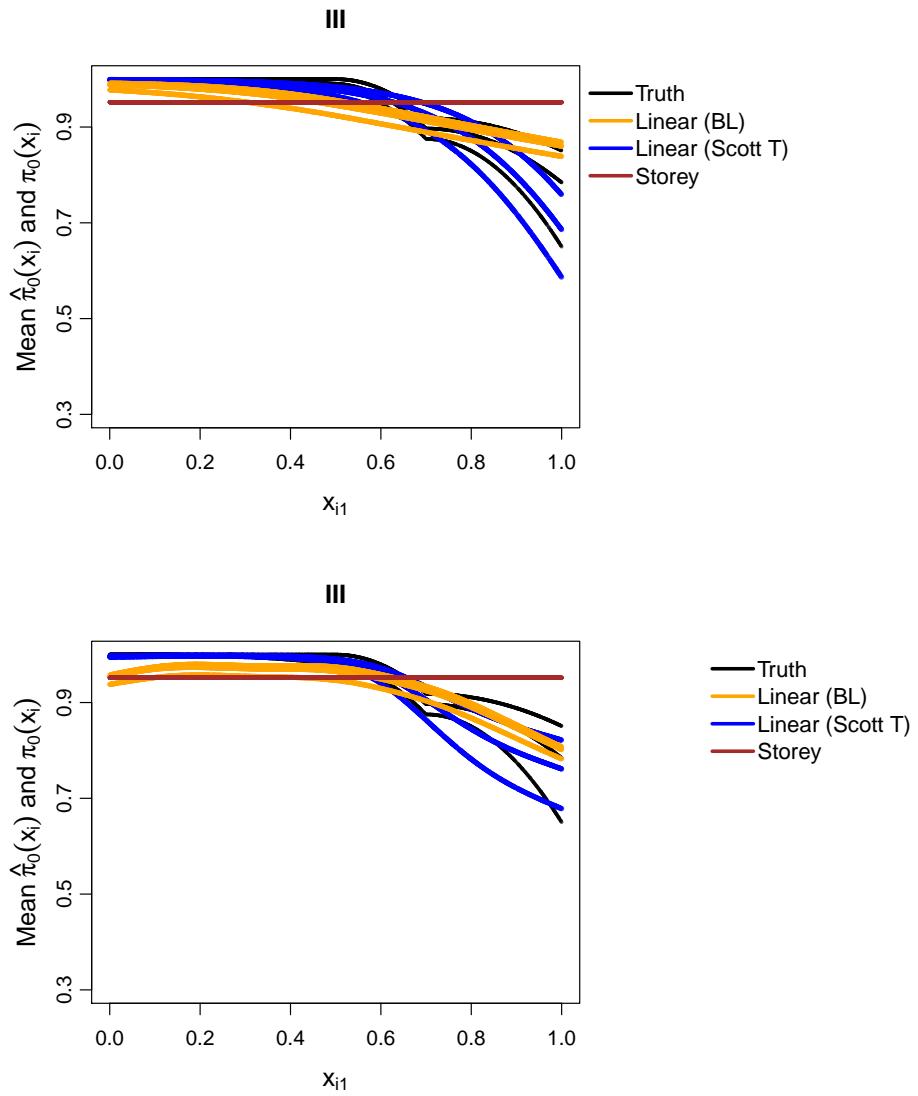
    "Linear (BL)",
    "Linear (Scott T)",
    "Storey"),
col=c("black",
      "orange",
      "blue",
      "brown"),
bty="n",
lwd=c(3,3,3,3), lty=c(1,1,1,1),
cex=1.2, x.intersp=0.2, y.intersp=1.0)

plotMeanPi0(pi0, pi0Spl.MeansVars, pi0hatSpl.ScottMean, pi0StoreyMean, tme=tme, main="IV")
legend("topright", inset=c(-0.7,0), ##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)

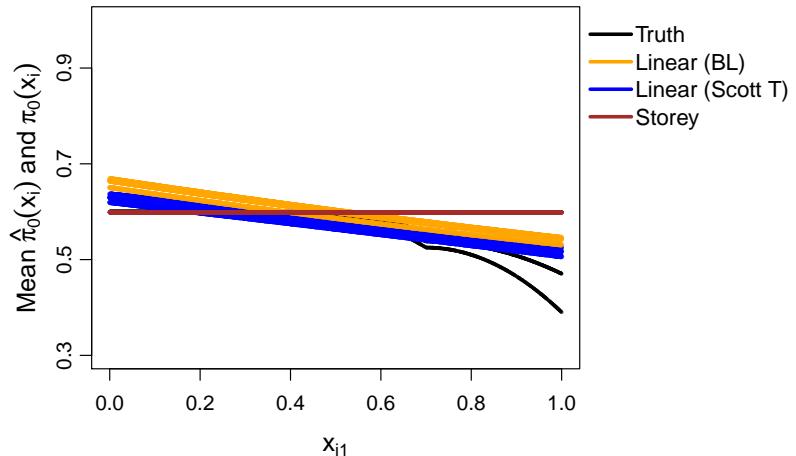
```



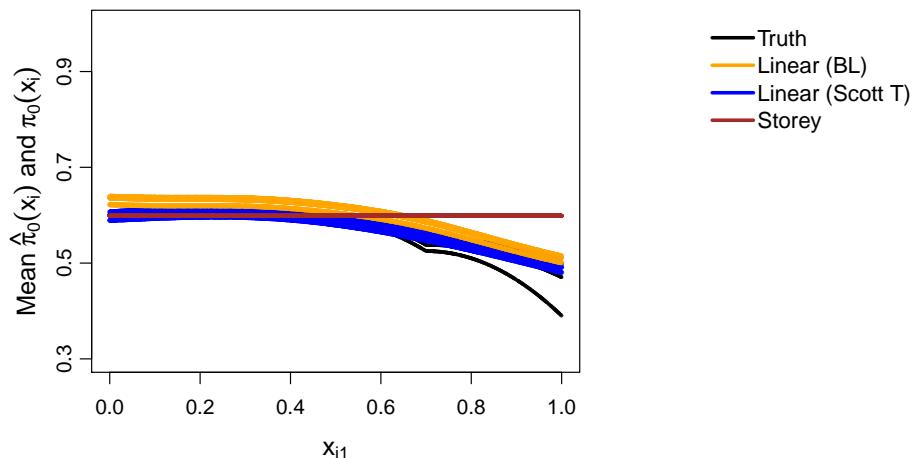




IV



IV



2 T-distributed test statistics

```
alt <- alts[2]
print("I")
## [1] "I"
```

```

load(paste(alternative,"simResults_1.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_thresh_1.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_emp_1.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_1.RData",sep="/"))

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

plotMeanPi0(pi0, pi0MeansVars, pi0hatScottMean, pi0StoreyMean, tme=tme, main="I")
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)

#####
print("II")
## [1] "II"

load(paste(alternative,"simResults_2.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_thresh_2.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_emp_2.RData",sep="/"))
load(paste(alternative,"simResults_pi0x_Scott_2.RData",sep="/"))

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

plotMeanPi0(pi0, pi0Lin.MeansVars, pi0hatLin.ScottMean, pi0StoreyMean, tme=tme, main="II")
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)

```

```

cex=1.2, x.intersp=0.2, y.intersp=1.0)

plotMeanPi0(pi0, pi0Spl.MeansVars, pi0hatSpl.ScottMean, pi0StoreyMean, tme=tme, main="III")
legend("topright", inset=c(-0.7,0),##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)

#####
print("III")
## [1] "III"

load(paste(alt,"simResults_3.RData",sep="/"))
load(paste(alt,"simResults_pi0x_thresh_3.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_emp_3.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_3.RData",sep="/"))

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

plotMeanPi0(pi0, pi0Lin.MeansVars, pi0hatLin.ScottMean, pi0StoreyMean, tme=tme, main="III")
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)

plotMeanPi0(pi0, pi0Spl.MeansVars, pi0hatSpl.ScottMean, pi0StoreyMean, tme=tme, main="III")
legend("topright", inset=c(-0.7,0),##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)

#####
print("IV")
## [1] "IV"

load(paste(alt,"simResults_4.RData",sep="/"))
load(paste(alt,"simResults_pi0x_thresh_4.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_emp_4.RData",sep="/"))
load(paste(alt,"simResults_pi0x_Scott_4.RData",sep="/"))

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

plotMeanPi0(pi0, pi0Lin.MeansVars, pi0hatLin.ScottMean, pi0StoreyMean, tme=tme, main="IV")
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)

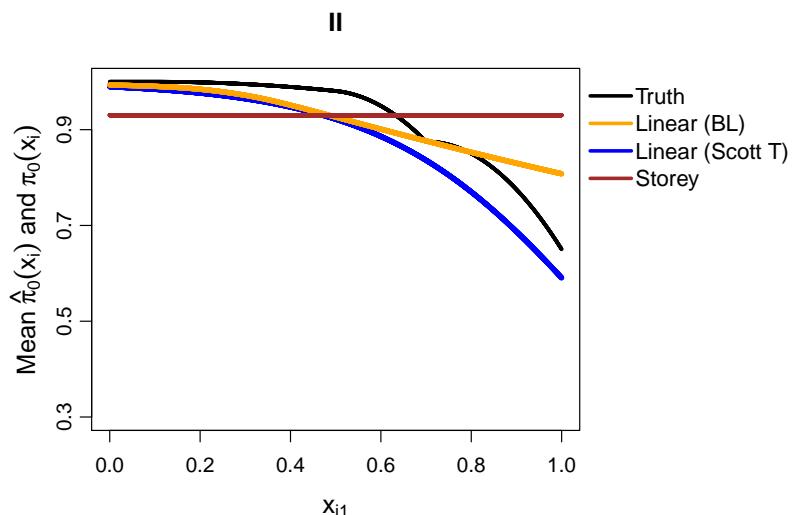
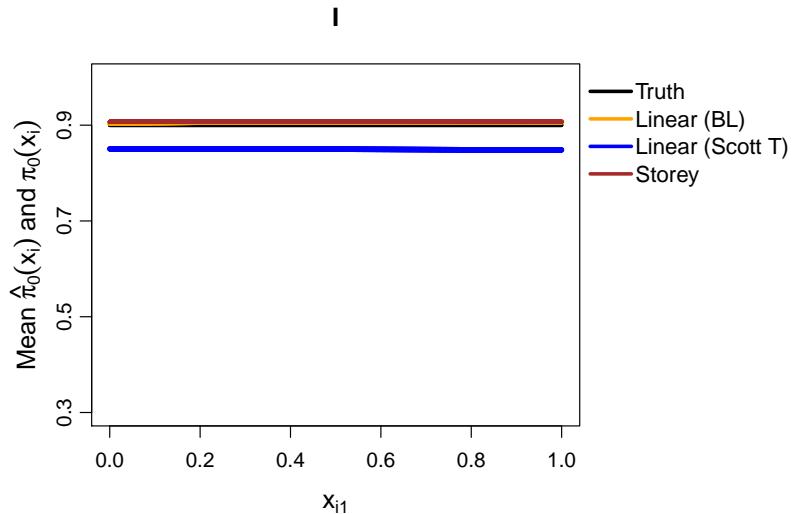
plotMeanPi0(pi0, pi0Spl.MeansVars, pi0hatSpl.ScottMean, pi0StoreyMean, tme=tme, main="IV")
legend("topright", inset=c(-0.7,0),##x=-0.2, y=0.45,##"bottomright", ##x=-100, y=0.3,
       legend=c("Truth",
                "Linear (BL)",
                "Linear (Scott T)",
                "Storey"),
       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)

```

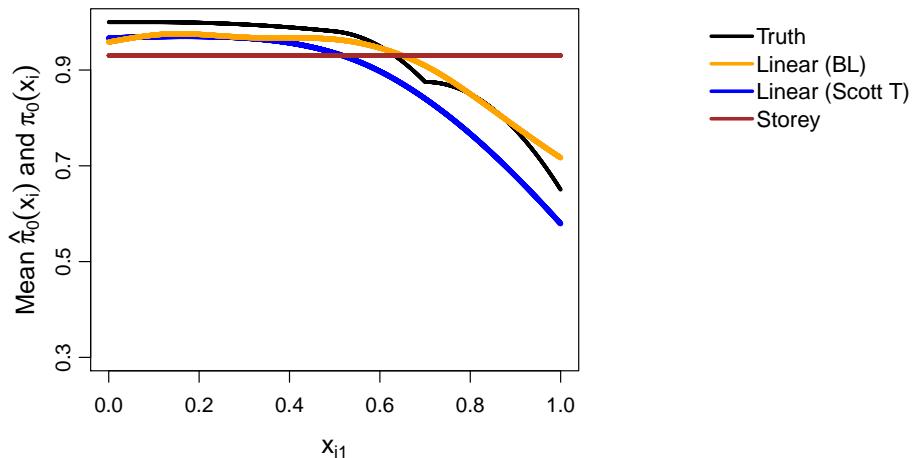
```

    "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)

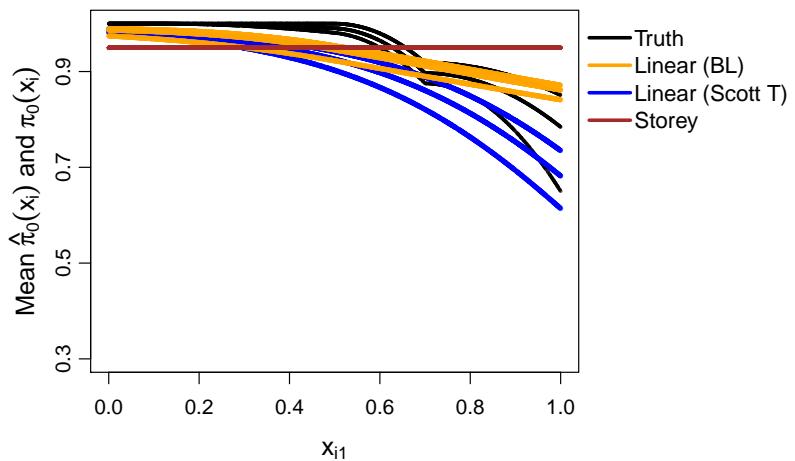
```



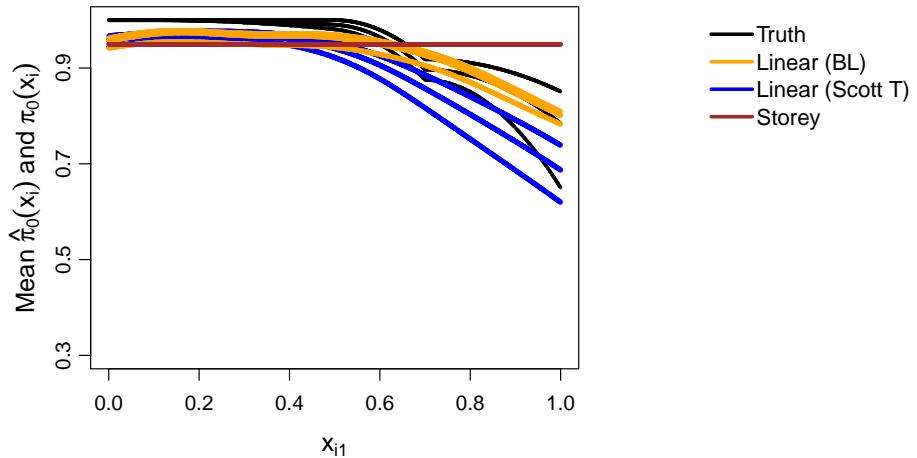
II



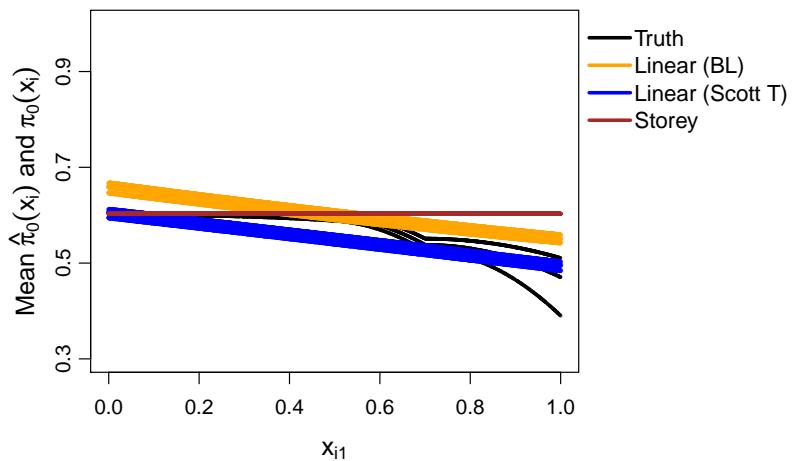
III



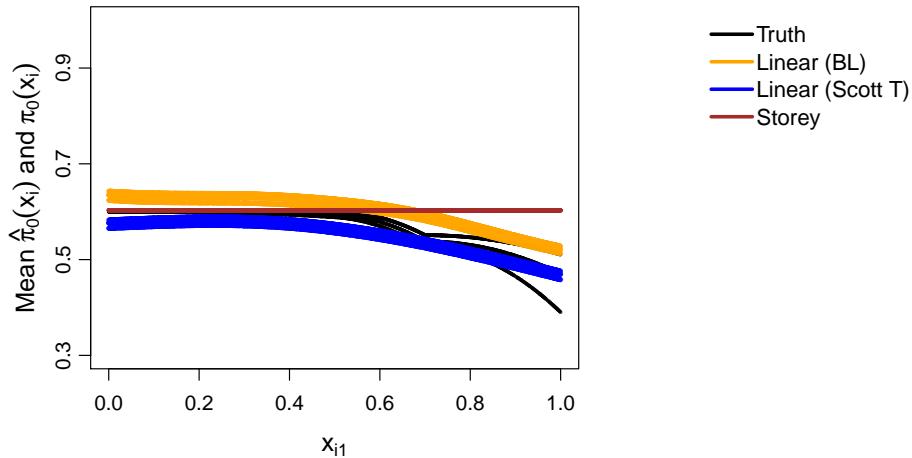
III



IV



IV



Session info:

```
devtools::session_info()

## Session info -----
## setting  value
## version  R version 3.4.4 (2018-03-15)
## system   i386, mingw32
## ui        RTerm
## language (EN)
## collate  English_United States.1252
## tz       America/New_York
## date     2018-06-08

## Packages -----
## package    * version    date
## base       * 3.4.4      2018-03-15
## colorspace  1.3-2      2016-12-14
## compiler    3.4.4      2018-03-15
## datasets   * 3.4.4      2018-03-15
## devtools    1.13.5     2018-02-18
## digest      0.6.15     2018-01-28
## evaluate    0.10.1     2017-06-24
## ggplot2     2.2.1.9000 2018-05-08
## graphics   * 3.4.4      2018-03-15
## grDevices  * 3.4.4      2018-03-15
## grid        3.4.4      2018-03-15
```

```
## gtable      0.2.0    2016-02-26
## highr       0.6     2016-05-09
## knitr      * 1.20    2018-02-20
## lazyeval    0.2.1    2017-10-29
## magrittr    1.5     2014-11-22
## MASS        * 7.3-49   2018-02-23
## memoise     1.1.0    2017-04-21
## methods     * 3.4.4    2018-03-15
## munsell     0.4.3    2016-02-13
## pillar      1.2.2    2018-04-26
## plyr        1.8.4    2016-06-08
## qvalue      * 2.10.0   2017-10-31
## Rcpp         0.12.16   2018-03-13
## reshape2    1.4.3    2017-12-11
## rlang        0.2.0.9001 2018-05-08
## scales       0.5.0.9000 2018-05-08
## splines     * 3.4.4    2018-03-15
## stats        * 3.4.4    2018-03-15
## stringi     1.1.7    2018-03-12
## stringr     1.3.0    2018-02-19
## tibble       1.4.2    2018-01-22
## tools        3.4.4    2018-03-15
## utils        * 3.4.4    2018-03-15
## withr        2.1.2    2018-03-15
## source
## local
## CRAN (R 3.4.1)
## local
## local
## CRAN (R 3.4.3)
## CRAN (R 3.4.3)
## CRAN (R 3.4.1)
## Github (tidyverse/ggplot2@f59ed7c)
## local
## local
## local
## CRAN (R 3.4.1)
## CRAN (R 3.4.1)
## CRAN (R 3.4.4)
## CRAN (R 3.4.2)
## CRAN (R 3.4.1)
## CRAN (R 3.4.4)
## CRAN (R 3.4.1)
## local
## CRAN (R 3.4.1)
```

```
## CRAN (R 3.4.4)
## CRAN (R 3.4.1)
## Bioconductor
## CRAN (R 3.4.4)
## CRAN (R 3.4.3)
## Github (r-lib/rlang@5ba52da)
## Github (hadley/scales@d767915)
## local
## local
## CRAN (R 3.4.4)
## CRAN (R 3.4.4)
## CRAN (R 3.4.3)
## local
## local
## CRAN (R 3.4.4)
```