Generate plot in Figure 4

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Load the relevant libraries:

```r
library(ggplot2)
library(reshape2)
library(dplyr)
```

Load the data and the results:

```r
load("BMI_GIANT_GWAS.RData")
load("BMI_GIANT_GWAS_results.RData")
load("BMI_GIANT_GWAS_results_Scott.RData")

tot <- BMI_GIANT_GWAS
```

Add the results to the data object:

```r
##add the estimates from Scott
tot$Scott <- pi0EstScott

##add the estimates from our approach
##add the estimates for lambda=0.8, lambda=0.9, final smoothed value
tot$fitted0.8 <- fitted0.8
tot$fitted0.9 <- fitted0.9
tot$fitted.final.smooth <- fitted.final.smooth
```

Only use random sample of 50,000 SNPs in plot:

```r
##get random sample of 50,000 SNPs
set.seed(310841)
d1 = tot %>% sample_n(5e4)
```
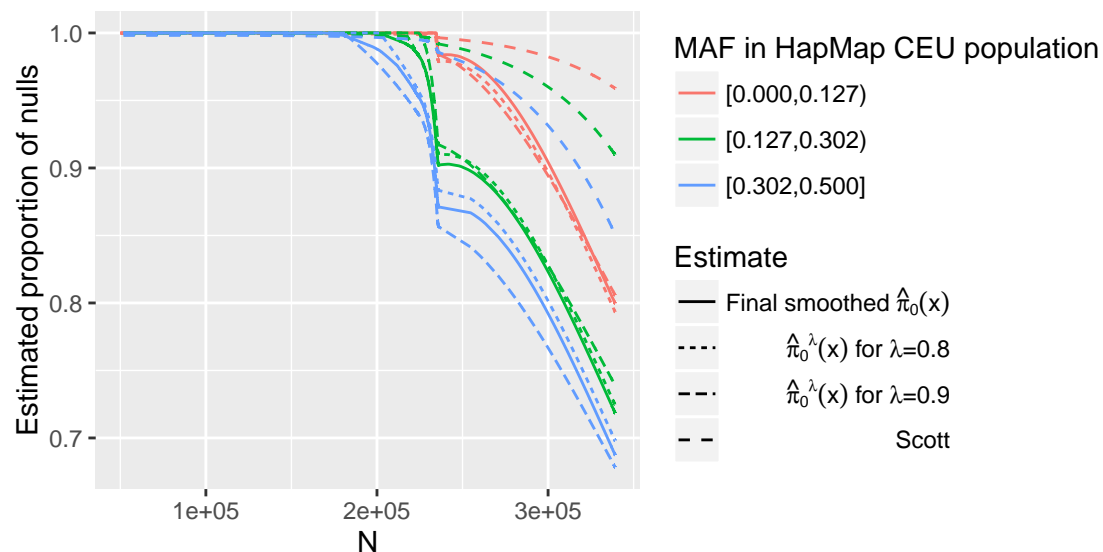
Create long data frame (for ggplot):

```r
colnames(d1)[colnames(d1)=="Scott"] <- "fitted.Scott"

d3 <- melt(d1,
           id.vars=colnames(d1)[-grep("fitted",colnames(d1))],
           value.name = "pi0",variable.name = "lambda")
d3$lambda <- as.character(d3$lambda)
d3$lambda[d3$lambda=="fitted0.8"] <- "lambda=0.8"
d3$lambda[d3$lambda=="fitted0.9"] <- "lambda=0.9"
d3$lambda[d3$lambda=="fitted.final.smooth"] <- "final smoothed pi0(x)"
d3$lambda[d3$lambda=="fitted.Scott"] <- "Scott"
```

Generate Figure 4:

```r
ggplot(d3, aes(x=N, y=pi0))+
  geom_line(aes(col=Freq_MAF_Int_Hapmap, linetype=lambda)) +
  ylab("Estimated proportion of nulls") +
  scale_linetype_discrete(labels =
                          c(expression(paste("Final smoothed ",
                                      hat(pi)[0](x))),
                            expression(paste(hat(pi)[0], ""^lambda,
                                      (x),
                                      " for ", lambda, "=",
                                      0.8)),
                            expression(paste(hat(pi)[0], ""^lambda,
                                      (x),
                                      " for ", lambda, "=",
                                      0.9)),
                            "Scott")) +
  guides(color=guide_legend(title="MAF in HapMap CEU population"),
         linetype=guide_legend(title="Estimate"))
```


Session Information

```r
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     2017-01-06
```

```
## Packages ---------------------------------------------------------------

##   package     * version   date       source
##   assertthat    0.1       2013-12-06 CRAN (R 3.3.1)
##   backports     1.0.4     2016-10-24 CRAN (R 3.3.2)
##   BiocStyle   * 2.0.2     2016-05-16 Bioconductor
##   codetools     0.2-14    2015-07-15 CRAN (R 3.3.1)
##   colorspace    1.2-6     2015-03-11 CRAN (R 3.3.1)
##   DBI           0.4-1     2016-05-08 CRAN (R 3.3.1)
##   devtools      1.12.0    2016-06-24 CRAN (R 3.3.1)
##   digest        0.6.9     2016-01-08 CRAN (R 3.3.1)
##   dplyr       * 0.5.0     2016-06-24 CRAN (R 3.3.1)
##   evaluate      0.10      2016-10-11 CRAN (R 3.3.2)
##   ggplot2     * 2.1.0     2016-03-01 CRAN (R 3.3.1)
##   gtable        0.2.0     2016-02-26 CRAN (R 3.3.1)
##   htmltools     0.3.5     2016-03-21 CRAN (R 3.3.1)
##   knitr         1.15.1    2016-11-22 CRAN (R 3.3.2)
##   labeling      0.3       2014-08-23 CRAN (R 3.3.0)
##   magrittr      1.5       2014-11-22 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)
##   R6            2.1.2     2016-01-26 CRAN (R 3.3.1)
##   Rcpp          0.12.6    2016-07-19 CRAN (R 3.3.1)
##   reshape2    * 1.4.1     2014-12-06 CRAN (R 3.3.1)
##   rmarkdown     1.2.9000  2016-11-28 Github (rstudio/rmarkdown@c46d1d1)
##   rprojroot     1.1       2016-10-29 CRAN (R 3.3.2)
##   scales        0.4.0     2016-02-26 CRAN (R 3.3.1)
##   stringi       1.1.1     2016-05-27 CRAN (R 3.3.0)
##   stringr       1.0.0     2015-04-30 CRAN (R 3.3.1)
##   tibble        1.1       2016-07-04 CRAN (R 3.3.1)
##   withr         1.0.2     2016-06-20 CRAN (R 3.3.1)
##   yaml          2.1.14    2016-11-12 CRAN (R 3.3.2)
```