Tables from simulations presented in lrd paper

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General dependencies.

```
library('knitr')
if(!require('lrd')){
 source("lrd/R/functions.r")
 source("lrd/R/simulations.r")
 source("lrd/R/displaySim.r")
}
```

Initialization. Note that `nreps=0` corresponds to no simulations, just print results from previously saved simulations. In order to re-run the simulations, the `nreps` variable should have been set to a positive integer before initiating this script.

```
if (!exists('nreps') ) nreps <- 0
nreps
```

```
## [1] 5000
```

```
if (nreps) {
library('robustbase')
library('rdd')
library('RItools')
library('sandwich')
library('nnet')
source("lrd/R/ddsandwich.R")
set.seed(201609)
st <- system.time(outcomeSim <- lrd:::totalOutcomeSim(nreps))
save(outcomeSim, file="dataResults/outcomeSim.RData")
cat(paste0(date(), ', nreps=', nreps, '\n'),
    paste(c(names(st),'\n', collapse=T)),
    st,
    file='dataResults/fullOutcomeSim-runtime.txt', append=TRUE)
} else load('dataResults/outcomeSim.RData')
```

```
levTab <- lrd:::levels(outcomeSim)
powTab <-lrd:::power(outcomeSim)
```

```
capture.output({

cat('
\\begin{table}
\\footnotesize
\\begin{tabular}{cc|ccccccc}
\\hline

&&& \\multicolumn{ 2 }{c}{Permutation}&\\multicolumn{ 2 }{c}{\`\`Limitless\'\'}&\\multicolum
$n$& Error &&', paste(rep('Level&Power',ncol(levTab)),collapse='&'),'\\\\
\\hline \n')
for(i in 1:nrow(levTab)){
    spec <- strsplit(rownames(levTab)[i],' ')[[1]]
    if(spec[1]=='norm'){
        cat('\\hline \n')
        cat('\\multirow{2}{*}{',round(as.numeric(spec[2])),'} & $\\mathcal{N}(0,1)$ &&')
    } else cat(' & $t_3$ &&')
    cat(paste(paste(round(levTab[i,]*100),round(powTab[i,]*100),sep='&'),collapse='&'),'\\\\
}
cat('\\hline
\\end{tabular}
\\caption{Proportion of ',ncol(outcomeSim[[1]]),' simulations resulting in a p-value below $
\\label{tab:level}',sep='')
cat('\\end{table}\n')
},file="tab-levelSimulation.tex")

kable(levTab,caption = 'Empirical size for hypothesis tests',digits = 2)
```

	cft	sh	ik	
norm 50	0.14	0.07	0.07	
t 50	0.10	0.07	0.06	
norm 250	0.48	0.05	0.05	
t 250	0.34	0.05	0.05	
norm 2500	1.00	0.05	0.05	
t 2500	1.00	0.05	0.05	

```
kable(powTab,caption = 'Empirical power for hypothesis tests, treatment effect =0.2',digits
```

	cft	sh	ik	
norm 50	0.32	0.08	0.08	
t 50	0.22	0.08	0.07	
norm 250	0.93	0.12	0.12	
t 250	0.79	0.10	0.08	
norm 2500	1.00	0.67	0.66	

	cft	sh	ik
t 2500	1.00	0.50	0.29

The polynomial sim was run in two parts: first for robust regression and OLS, and next for local linear regression with the IK bandwidth.

```
if (!exists('nreps') ) nreps <- 0
nreps
```

```
## [1] 5000
```

```
if (nreps) {
library('robustbase')
library('rdd')
library('RItools')
library('sandwich')
library('nnet')
source("lrd/R/ddsandwich.R")
set.seed(201609)
st2 <- system.time(totalPoly <- lrd:::totalPolySim(nreps))
st3 <- system.time(ikp <- lrd:::totalPolySimIK(nreps))
save(totalPoly,file="dataResults/totalPolySim.RData")
save(ikp,file="dataResults/ikp.RData")
cat(paste0(date(), ', nreps=', nreps, '\n'),
    paste(c(names(st),'\n', collapse=T)),
    st,
    file='dataResults/totalPolySim-runtime.txt', append=TRUE)
} else{
    load('dataResults/totalPolySim.RData')
    load('dataResults/ikp.RData')
    }
```

```
## lin   TRUE
## [1] "2017-10-19 01:46:50 CDT"
## lin   FALSE
## [1] "2017-10-19 01:49:07 CDT"
## antiSym   TRUE
## [1] "2017-10-19 01:51:37 CDT"
## antiSym   FALSE
## [1] "2017-10-19 01:53:55 CDT"
## oneSide   TRUE
## [1] "2017-10-19 01:56:25 CDT"
## oneSide   FALSE
## [1] "2017-10-19 01:58:43 CDT"
```

The following gives the results in Table 4 of the paper, in addition to the

break-down of RMSE into bias and variance, and analogous results for normally-distributed errors.

```
capture.output(
lrd:::prntTab(totalPoly,ikp,full=FALSE,caption=paste0('Results from ',ncol(totalPoly[[1]]),'
file="lrd/inst/tab-polynomialSimulation.tex")
kable(prntTab(totalPoly,ikp,full=TRUE,md=TRUE),
      caption='Full results for polynomial simulation',digits=2)
```

	Rob, deg= 1	Rob, deg= 2	Rob, deg= 3	Rob, deg= 4	OLS, deg= 1	OLS, deg= 2	OLS, deg= 3	OLS, deg= 4	Loc.Lin
lin t err level	0.37	0.38	0.05	0.05	0.40	0.29	0.07	0.06	0.08
lin t err RMSE	0.36	0.36	0.25	0.25	0.36	1.08	2.88	13.12	0.29
lin t err bias	-0.31	-0.31	0.00	0.00	-0.31	0.88	0.83	-4.29	0.00
lin t err sd	0.19	0.18	0.25	0.25	0.18	0.64	2.76	12.40	0.29
antiSym t err level	0.92	0.92	0.06	0.06	0.93	0.77	0.10	0.11	0.06
antiSym t err RMSE	0.64	0.64	0.25	0.25	0.66	1.83	3.23	15.63	0.29
antiSym t err bias	-0.62	-0.62	-0.02	-0.02	-0.63	1.71	1.76	-9.21	0.01
antiSym t err sd	0.18	0.18	0.25	0.25	0.19	0.64	2.71	12.63	0.29
oneSide t err level	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.08
oneSide t err RMSE	0.18	0.18	0.24	0.24	0.18	0.64	2.72	12.70	0.28
oneSide t err bias	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00
oneSide t err sd	0.18	0.18	0.24	0.24	0.18	0.64	2.72	12.70	0.28
lin norm err level	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06
lin norm err RMSE	0.22	0.22	0.30	0.30	0.31	1.09	4.75	21.85	0.48
lin norm err bias	0.00	0.00	0.01	0.01	0.00	0.02	-0.08	-0.24	0.01
lin norm err sd	0.22	0.22	0.30	0.30	0.31	1.09	4.75	21.85	0.48

	Rob, deg= 1	Rob, deg= 2	Rob, deg= 3	Rob, deg= 4	OLS, deg= 1	OLS, deg= 2	OLS, deg= 3	OLS, deg= 4	Loc.Lin
antiSym norm err level	0.79	0.79	0.06	0.06	0.54	0.37	0.06	0.07	0.07
antiSym norm err RMSE	0.64	0.64	0.30	0.30	0.70	2.10	5.16	25.45	0.49
antiSym norm err bias	-0.60	-0.60	-0.02	-0.02	-0.63	1.73	1.70	-9.08	0.00
antiSym norm err sd	0.20	0.20	0.30	0.30	0.31	1.20	4.88	23.77	0.49
oneSide norm err level	0.29	0.30	0.05	0.05	0.19	0.13	0.06	0.05	0.07
oneSide norm err RMSE	0.39	0.39	0.30	0.30	0.45	1.41	4.88	22.49	0.49
oneSide norm err bias	-0.32	-0.32	-0.01	-0.01	-0.32	0.87	0.93	-4.52	0.00
oneSide norm err sd	0.23	0.23	0.30	0.30	0.31	1.11	4.79	22.03	0.49

Session information

```
sessionInfo()
```

```
## R version 3.3.1 (2016-06-21)
## Platform: x86_64-apple-darwin13.4.0 (64-bit)
## Running under: OS X 10.12.6 (Sierra)
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
##  [1] nnet_7.3-12       RItools_0.2-0     SparseM_1.77
##  [4] rdd_0.57          Formula_1.2-1     AER_1.2-4
```

```
##  [7] survival_2.40-1   car_2.1-4         lmtest_0.9-34
## [10] zoo_1.7-13        sandwich_2.3-4    robustbase_0.92-7
## [13] knitr_1.15.1      lrd_0.0.0.9000
##
## loaded via a namespace (and not attached):
##  [1] Rcpp_0.12.8         DEoptimR_1.0-8     nloptr_1.0.4
##  [4] highr_0.6           tools_3.3.1        lme4_1.1-12
##  [7] evaluate_0.10       nlme_3.1-128       lattice_0.20-33
## [10] mgcv_1.8-15         Matrix_1.2-6       parallel_3.3.1
## [13] stringr_1.1.0       MatrixModels_0.4-1 grid_3.3.1
## [16] minqa_1.2.4         magrittr_1.5       MASS_7.3-45
## [19] splines_3.3.1       rsconnect_0.5      svd_0.4
## [22] abind_1.4-5         pbkrtest_0.4-6     xtable_1.8-2
## [25] quantreg_5.29       stringi_1.1.1
```