University of California, Santa Cruz
Department of Applied Mathematics and Statistics
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AMS 206 (Applied Bayesian Statistics)

Incorporating .pdf Plots Into LaTeX

In an R tutorial on the course web page, I showed you how to use the pdf function in R to spool a plot into a .pdf file; here's an example of how to incorporate such plots into a LaTeX document.

Table 1 presents the R code used to make the plot presented below and illustrates the use of the table environment in LaTeX. Let's suppose that you have a directory called AMS-206 in which you keep all of your files for this course.

Table 1: *R code to create the plot incorporated into this document.*

```
# code to illustrate various aspects of plotting functions in R
#
# here you would use a setwd command (or the ‘Change dir...’ option
# from the File pull-down menu in R) to ensure that the .pdf file
# is stored in your directory AMS-206
#
p <- seq( 0.001, 0.999, length = 500 )
plot( p, log( p / ( 1 - p ) ), type = 'l', lwd = 2,
  ylab = 'logit( p ) = log( p / ( 1 - p ) )' )
text( 0.4, 4.0, 'this is the logistic or logit transformation;' )
text( 0.4, 3.25, 'it maps probabilities onto the whole real line' )
lines( p, 4 * p - 2, lty = 2, lwd = 2, col = 'red' )
text( 0.6, -4.0, "it's approximately linear for p in ( 0.3, 0.7 )" )
#
# use this code to make a PDF file to incorporate into your Latex document
#
pdf( 'ams-206-logit-plot.pdf' )
plot( p, log( p / ( 1 - p ) ), type = 'l', lwd = 2,
  ylab = 'logit( p ) = log( p / ( 1 - p ) )' )
text( 0.4, 4.0, 'this is the logistic or logit transformation;' )
text( 0.4, 3.25, 'it maps probabilities onto the whole real line' )
lines( p, 4 * p - 2, lty = 2, col = 'red' )
text( 0.6, -4.0, "it's approximately linear for p in ( 0.3, 0.7 )" )
dev.off( )
```

Figure 1 displays the .pdf graph created with the R code in Table 1. To use the includegraphics command in LaTeX, you'll need to include the graphicx package in the usepackage specification in the preamble of your LaTeX document (the second line of LaTeX code in this document).

Figure 1: *A plot of logit(p) against p, to examine its nonlinearity.*

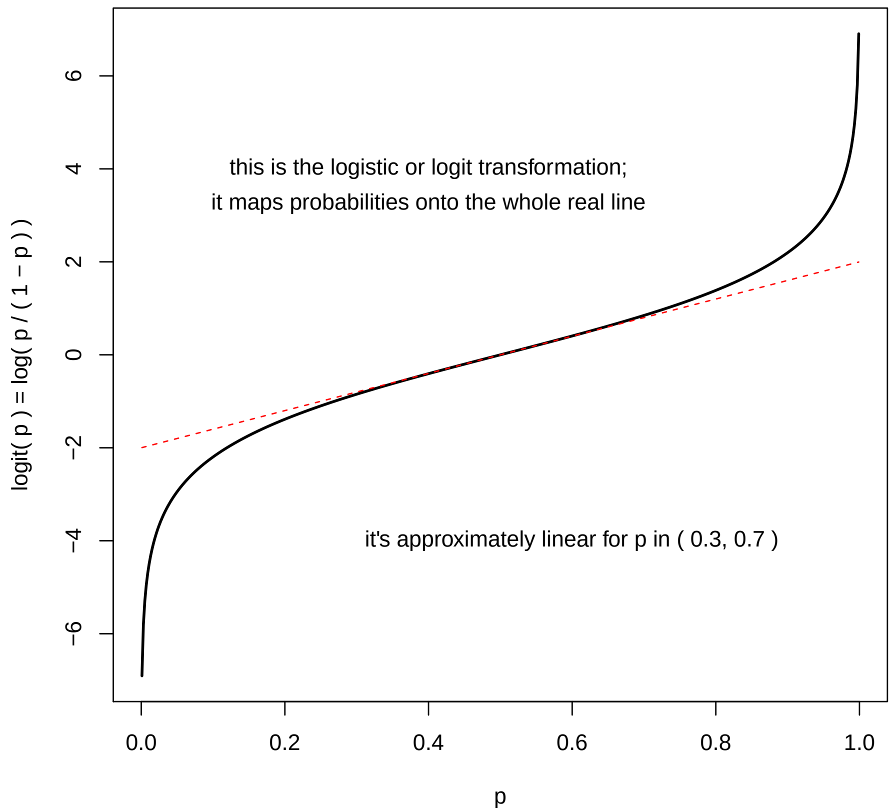

Table 2: ***Maple** code to work out the Taylor expansion of logit(p) around $p = 0.5$ to third order.*

```
help( taylor );
taylor( log( p / ( 1 - p ) ), p = 0.5, 3 );

                4.000000000 ( p - 0.5 ) + O[ ( p - 0.5 )^3 ]
```

Table 2 gives `Maple` code that computes the linear Taylor expansion used to plot the dotted line in Figure 1. You can see that there is no quadratic term in this expansion; this explains why the linear approximation is so good over such a wide range of values of p.