Homework 1A

STAT 242: Intermediate Statistics

The code below loads packages and makes it so that enough digits are printed that you won't get confused by rounding errors.

```
library(dplyr) # functions like summarize
library(ggplot2) # for making plots
library(mosaic) # convenient interface to t.test function
options("pillar.sigfig" = 10) # print 10 significant digits in summarize output
```

Problem 1: Adapted from *The Statistical Sleuth*, Problem 2.23

The National Highway System Designation Act was signed into law in the United States on November 29, 1995. Among other things, the act abolished the federal mandate of 55-mile-per-hour maximum speed limits on roads in the United States and permitted states to establish their own limits. Of the 50 states, plus the District of Columbia, 32 increased their speed limits either at the beginning of 1996 or sometime during 1996. The R code below reads in data with the percentage changes in interstate highway traffic fatalities from 1995 to 1996 (the variable is called `PctChange` in the data frame). Among the states where the speed limit increased, what evidence is there that the average percent change in fatalities was different from 0?

Conduct a full analysis, including:

- an appropriate plot with informative axis labels,
- summary statistics that would be meaningful to someone who had not taken a statistics class (i.e., don't report the t statistic),
- a confidence interval, and
- a hypothesis test.

Interpret all of your results in context. Explain how to interpret the p-value for the test and the conclusions that can be drawn from it as though to someone who had not taken a statistics class. Similarly, explain how to interpret your confidence interval. You do not need to calculate the p-value or the confidence interval by hand; you can use output from the `t.test` function in R. What conclusions can be drawn about whether this policy change was a good idea?

```
library(Sleuth3) ## load library for our textbook
fatalities <- subset(ex0223, SpeedLimit == "Inc")
## only include those for which the speed limit was increased
```