### Homework 7: Perception Reaction Time
10 Points: Due at beginning of class, Thursday, 16 April 2015

There are two parts to this homework assignment. Each part counts 5 points. Late homework will receive a grade of zero.

Part 1: The distances required to bring a car to a stop from various speeds by braking (from the moment that the brake is applied to full stop) are illustrated in the graph.
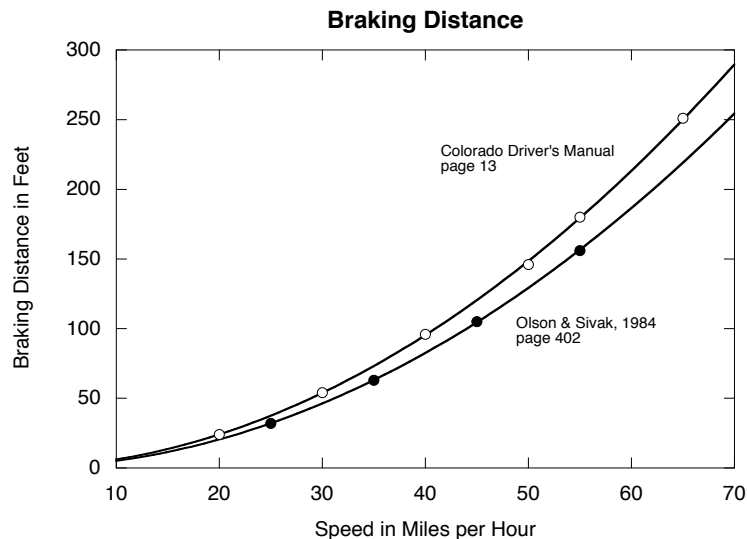
The two sets of data are from different sources but they are quite similar. The upper set of data, taken from the Colorado Driver's Manuel, is described by the following equation:

$$Feet = 0.062673 \cdot MPH^{1.9862}$$

At 55 miles per hour this equation predicts that an average automobile needs about 179 feet to brake to a complete stop. In actual driving we add the distance traveled during the perception reaction time (PRT). Assume that the perception reaction time is 2.0 seconds. What is the minimum visibility distance, in feet, needed to be able to bring a car traveling 55 mph to a stop to avoid hitting a pedestrian standing in the roadway? Show your calculations and explain your answer. Hint: for both parts of this homework it will be helpful to write functions in R that evaluate the equations that you need. For example, the above braking-distance-equation would be:

```
braking.distance.ft <- function(mph){0.062673*(mph^1.9862)}
```

To find the braking distance at 10 mph, for example, you would type:

```
braking.distance.ft(10)
```

Part 2: If the automobile's low beam headlights provide effective illumination of a darkly-clad pedestrian out to a distance of 120 feet, will the car described in Part I hit the pedestrian at night? What is the maximum speed that will allow a car to stop just short of the pedestrian? Show your calculations and explain the basis of your answer. Prepare a plot showing the total stopping distance (PRT + Braking) on the y-axis, for speeds ranging from 1 to 60 mph on the x-axis, assuming a PRT of 2.0 sec. Mark the speed on the graph that will require 120 feet of stopping distance