

Homework 4: Perception Reaction Time 10 Points: Due at beginning of class, Thursday, 19 February 2009

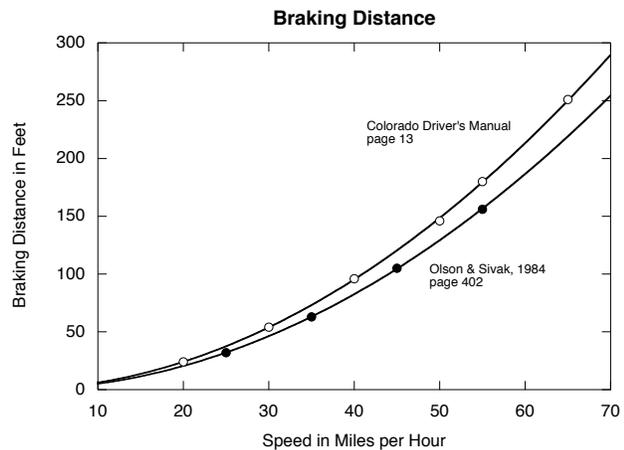
There are two parts to this homework assignment. Each part counts 5 points. Late homework will receive a grade of zero.

Part 1: The distances required to bring a car to a stop from various speeds by braking are illustrated in the graph. There are two sets of data from two different sources. The upper set of data, from the Colorado Driver's Manual, is described by the following equation:

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

At 50 miles per hour this equation predicts that an average automobile needs about 148 feet to brake to a stop. 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 50 mph to a stop to avoid hitting a pedestrian standing in the roadway? Show your calculations and explain your answer.

Part 2: If the automobile's low beam headlights provide effective illumination of a darkly-clad pedestrian out to a distance of 100 feet, will the car described in Part I hit the pedestrian at night? What is the maximum speed of a car that will allow it to stop just short of the pedestrian? Show your calculations and explain the basis of your answer.



Hint: for both parts of this homework it will be helpful to write functions in R that evaluated the equations that you need. For example, in R the braking distance equation above would be:

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

To then find the braking distance at 10 mph you would execute the command:

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