

# Probability Project - MST 109 - Fall 2017

Due on Friday November 10, 2017

The following problems are from the book " Fifty Challenging Problems in Probability with Solutions " by Fredrick Monsteller. Choose two of these problems and present a full solution for each of the given problem. Please justify completely every claim you make.

## I) The Sock Drawer

A drawer contains red socks and black socks. When two socks are drawn at random, the probability that both are red is  $\frac{1}{2}$ .

- a) How small can the number of socks in the drawer be?
- b) How small if the number of the black socks in even?

## II) Successive Wins

To encourage Elmer's promising tennis career, his father offers him a prize if he wins ( at least ) two tennis set in a row in a three-set to be played with his father and the club champion alternately: father-champion-father or champion-father-champion, according to Elmer's choice. The champion is a better player than Elmer's father. Which series should Elmer choose?

## III) The Unfair Subway

Marvin gets off work at random times between 3 and 5 P.M. His mother lives uptown, his girlfriend downtown. He takes the first subway that comes in either direction and eats dinner with the one he is first delivered to. His mother complains that he never comes to see her, but he says she has 50-50 chance. He has had dinner with her twice in the last 20 working days. Explain how is that possible knowing that both subways (uptown and downtown) run once every 10 minutes.