

# Math 55: Homework 10

Due Monday, July 27

1. Two dice are rolled. What is the probability that the product of the numbers rolled is divisible by 3 given that the sum of the numbers rolled is at least 8?
  
  
  
  
  
  
  
  
  
  
2. There is a 50% chance of precipitation tomorrow (rain or snow, depending on the temperature) and a 70% chance that the temperature will be below freezing. If there is precipitation and the temperature is below freezing then it will snow. If there is precipitation but the temperature is not below freezing then it will rain.
  - (a) If the two given events (precipitation and cold) are independent, what is the probability that it will snow tomorrow?
  
  
  
  
  
  
  - (b) If the two given events are independent, what is the probability that it will not rain tomorrow?
  
  
  
  
  
  
  - (c) Even if the two events are not independent, prove that the probability that it will snow tomorrow is at least 20%.
  
  
  
  
  
  
  
  
  
  
3. (From *Fifty Challenging Problems in Probability*, by Frederick Mosteller)

To encourage Elmer's promising tennis career, his father offers him a prize if he wins (at least) two tennis sets *in a row* in a three-set series 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? [Assume that the outcomes of the three matches are independent.] (Hint: let  $p$  be the probability that Elmer can beat his father and  $q$  be the probability that he can beat the champion, and use the fact that  $p > q$ .)