

Mth3301  
Homework #2 (Covers Modules 6-9)  
Due September 29<sup>th</sup>

1. A die is thrown 7 times. Find
  - (a) Pr ('6' comes up at least once).
  - (b) Pr (each face appears at least once).
  
2. Twenty items (12 bad, 8 good) are inspected. If the items are chosen at random, what's the probability that
  - (a) The first two are bad?
  - (b) The first two are good?
  - (c) One of each in the first two?
  
3. A box contains 4 bad and 6 good tubes. Two are drawn out. One is tested and found to be good. What's the probability that the other is good?
  
4. In a class there are 4 freshman boys, 6 freshman girls, and 6 sophomore boys. How many sophomore girls must be present if gender and class are to be independent when a student is selected at random?
  
5. If  $A$  and  $B$  are independent,  $\Pr(A) = 0.4$ , and  $\Pr(A|B) = 0.6$ , find  $\Pr(B)$ ?
  
6. Suppose  $\Pr(A) = 0.4$ ,  $\Pr(A|B) = 0.7$ , and  $\Pr(B) = x$ .
  - (a) For what choice of  $x$  are  $A$  and  $B$  disjoint?
  - (b) Independent?
  
7. Prove: If  $\Pr(A|B) > \Pr(A)$ , then  $\Pr(B|A) > \Pr(B)$ .
  
8. The probability of scoring a basket is  $p$ . Joe shoots first. If he misses, Fred gets to shoot. They shoot the ball back and forth until somebody scores. What's the probability that Joe wins? Graph this as a function of  $p$ .
  
9. Consider two boxes. The first box contains one black marble and one white marble. The second box contains two blacks and one white. A box is selected at random and a marble is drawn at random from the selected box.
  - (a) Find  $\Pr$  (the marble is black).
  - (b) What is the probability that the marble was selected from the first box given that the marble is white?
  
10. A gambler has in his pocket a fair coin and a two-headed coin.
  - (a) He selects one at random, and when he flips it, it shows heads. What's the probability that the coin is fair?
  - (b) He flips the same coin and it again shows heads. Same question.
  - (c) He flips it a third time and it shows tails. Same question.