

Math 107
Probability HW#2

1) You roll a pair of standard six sided dice and look at the **minimum of the two numbers** (for example you roll a 4 and 5 the answer is 4)

- a) Construct a “dice chart” for this experiment
- b) What is the probability the minimum of the two dice is 1? What is the probability that the minimum of the two dice is 5?

2) Consider the following tables which shows preferences concerning movies from a selected audience. The following table shows the favorite movie per each group

Age/Movie	Rogue 1	La la Land	Lion
15-19 years old	50	7	8
20-29 years old	45	15	20
30-39 years old	11	46	35
40 + years old	13	25	60

- a) If you select one person from this group, what is the probability that you will select someone who favors Rogue 1
- b) If you select one person from this group what is the probability that you select a 30-39 year old given that they prefer La La Land
- c) What is the probability if you select one person from this group you get someone who prefers Lion or a 20-29 year old?

3) You play the following game. You roll a single dice and get the dollar amount of the outcome (for example if you roll a 4 you get \$4). What is the expected value of this game? If you pay \$5 to play the game is this a “fair” game – why or why not?

4) A old carnival game worked as follows – you pay \$5 to select a bill from a bag. The bag contained 12 one dollar bills, 4 \$5 bills, 3 \$10 bills and 1 \$20 bill. What is the expected value of this game? Should you play?

- 5) Suppose a company charges \$450 for a premium for a fire insurance policy. In the case of a fire claim the company will pay out \$100000. Suppose the probability of fire claim in a given year is 0.004. What is the expected annual profit (or loss) for the insurance company on this policy? What annual profit should the company expect if they 1000 such policies?
- 6) You play Roulette and decide to bet always on the number 15 – the payout is 35 to 1 meaning if you play \$1 you get \$35 if you get a 15 if you do not get a 15 you lose \$1. What is the expected value of this game? What would your expected “winnings” be if you played this game in this manner 1000 times?
- 7) Suppose an insurance company sells an insurance policy for \$750 a month. It is determined that 10 out of every 1000 customers will make claim with an average payment of \$2000. Furthermore it is determined that 2 out of every 1000 customers will make a claim with an average payment of \$10000.
 - a. What is the expected value of this insurance policy (from the insurance company’s perspective)
 - b. Explain the meaning of the result in part a using a complete sentence
 - c. Suppose the insurance company sells 10000 of these policies, what is the expected profit from this sale using the information you determined in part a
- 8) You roll two dice and look at the sum you receive. If the sum is 2, 3, 4, 10, 11, or 12 you receive \$8. If the sum is 5,6,7,8,9 you lose \$2, Determine if this is fair game or not