

AP Statistics

Unit 04 – Probability

Homework #5

Name _____

Period _____

1. A commuter must pass through five traffic lights on her way to work and will have to stop at each one that is red. She estimates the probability model for the number of red lights she hits, as shown below:

X = # of red	0	1	2	3	4	5
P(X=x)	0.05	0.25	0.35	0.15	0.15	0.05

- a. How many red lights should she expect to hit each day?
- b. What is the standard deviation of X?
2. Your company bids for two contracts. You believe the probability you get contract #1 is 0.8. If you get contract #1, the probability you also get contract #2 will be 0.2, and if you do not get #1, the probability you get #2 will be 0.3.
- a. Are the two contracts independent? Explain.
- b. Find the probability you get both contracts
- c. Find the probability you get no contract.

d. Let X be the number of contracts you get. Find the probability model (distribution) for X .

e. Find the expected value (mean) and standard deviation of X .

3. Keno is a favorite game in casinos, and similar games are popular with the states that operate lotteries. Balls numbered 1-80 are tumbled in a machine as the bets are placed, then 20 of the balls are chosen at random. Players select numbers by marking a card. The simplest of the many wagers available is "Mark 1 number." Your payoff is \$3 on a \$1 bet if the number is chosen. Because 20 of 80 numbers are chosen, your probability of winning is $20/80$, or 0.25. Let X = the next amount you gain on a single play of the game.

a. Make a table that shows the probability distribution of X .

b. Compute the expected value and standard deviation of X . Explain what this result means for the player.

4. The weights of 3-year-old females closely follow a Normal distribution with a mean of $\mu = 30.7$ pounds and a standard deviation of 3.6 pounds. Randomly choose one 3-year-old female and call her weight X . What is the probability that a randomly selected 3-year-old female weighs at least 30 pounds?

5. You draw a card from a deck. If you get a red card, you win nothing. If you get a spade, you win \$5. For any club, you win \$10 plus an extra \$20 for the ace of clubs.

a. Create a probability model for the amount you win.

b. Find the expected amount you'll win.

c. What would you be willing to pay to play this game?

6. Let X be a number between 0 and 1 produced by a random number generator. Assuming that the random variable X has a uniform distribution, find the following probabilities:
- $P(X > 0.49)$
 - $P(X \geq 0.49)$
 - $P(0.19 \leq X < 0.37 \text{ or } 0.84 < X \leq 1.27)$
7. The Normal distribution with mean $\mu = 6.8$ and standard deviation $\sigma = 1.6$ is a good description of the Iowa Test of Basic Skills (ITBS) vocabulary scores of seventh-grade students in Gary, Indiana. Call the score of a randomly chosen student X for short. Find $P(X \geq 9)$ and interpret the results.
8. Professional tennis player Rafael Nadal hits the ball extremely hard. His first-serve speeds follow a Normal distribution with a mean 115 miles per hour (mph) and standard deviation 6 mph. Choose one of Nadal's first serves at random. Let Y = its speed, measured in miles per hour.
- Find $P(Y > 120)$ and interpret the results.
 - What is $P(Y \geq 120)$? Explain.
 - Find the value of c such that $P(Y \leq c) = 0.15$. Show your work.