Homework 5; Wednesday, March 18

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1) Consider each of the following distributions. Determine if it is a valid probability distribution or not, and explain your answer.

a) Distribution 1

x	P(x)
0	0.25
1	0.60
2	0.15

b) Distribution 2

y	P(y)
0	0.25
1	0.60
2	0.20

2) In the following problems, $p(i)$ stands for $P(X = i)$. Find the expected value $E(X)$ when:

a. $p(1) = 0.1$, $p(2) = 0.3$, $p(3) = 0.3$, $p(4) = 0.2$, $p(5) = 0.1$

b. $p(1) = 0.2$, $p(2) = 0$, $p(3) = 0.6$, $p(4) = 0$, $p(5) = 0.2$

c. $p(3) = 1$

3) Consider the following probability distributions. Compute the standard deviation when:

a. $p(1) = 1/3$, $p(2) = 1/3$, $p(3) = 1/3$

b. $p(1) = 1/2$, $p(2) = 1/3$, $p(3) = 1/6$

4) Suppose that a random variable X can take on any of the values 1, 2, and 3. Find the expected value $E(X)$ and the variance $Var(X)$ if: $p(1) = 0.3$ and $p(2) = 0.5$

5) Consider two random variables X and Y. If you known that $E(X) = 5$, and $E(Y) = 12$, find:

a. $E(3X + 4Y) =$

b. $E(4 + Y) =$

c. $E(2 + 5Y + X) =$

6) 1000 raffle tickets are sold and the winner is chosen at random. There is only one prize: $500 in cash. You buy one ticket.

a. What is the probability you will win the prize of $500?

b. Your expected earnings can be found by multiplying the value of the prize by the probability you will win the prize. What are your expected earnings?

c. If a tickets costs $2, what is the difference between your "costs" and "expected earnings"? (In other words: the difference between what you paid minus what you expect to earn?

7) If the two teams in a World Series have the same chance of winning each game, independent of the results of the previously played games, then the probabilities that the series will end in 4, 5, 6 or 7 games are:

P(series will end in 4 games) = 1/8
P(series will end in 5 games) = 1/4
P(series will end in 6 games) = 5/16
P(series will end in 7 games) = 5/16

What is the expected number of games played in such a series?

8) If it rains tomorrow, you will earn $200 by doing some tutoring; if it is dry, you will earn $300 by doing construction work. If the probability of rain is 1/4 , what is the expect amount that you will earn tomorrow?

9) An investment has a 0.4 probability of making a $30,000 profit, and a 0.6 probability of losing $15,000. Does this investment have a positive expected gain?

10) Norb and Gary are playing a golf tournament. Their scores are random variables with the following means and standard deviations:

Norb, X_1: $\mu_1 = 115$, $\sigma_1 = 12$

Gary, X_2: $\mu_2 = 100$, $\sigma_2 = 8$

Assume the scores of Norb and Gary to be independent of each other.

a. The difference between their scores is $W = X_1 - X_2$. Compute the mean, variance and standard deviation for W.

b. The average of their scores is $A = 0.5X_1 + 0.5X_2$. Compute the mean, variance and standard deviation for A.

c. The tournament rules have a special handicap system for each player. For Norb, the handicap formula is $L = 0.8X_1 - 2$. Compute the mean, variance, and standard deviation for the random variable L.

d. For Gary, the handicap formula is $H = 0.95X_2 - 5$. Compute the mean, variance, and standard deviation for the random variable H.

11) The following table contains data of percentages of fishermen who catch fish in a 6 hour period. Let X be the number of fish caught in a 6-hour period.

X	0	1	2	3	4 or more
%	44%	36%	15%	4%	1%

a. Make a graph of the probability distribution of X

b. Find the probability that a fisherman catches one or more fish in a 6-hour period.

c. Find the probability that a fisherman catches two or more fish in a 6-hour period.

d. Compute the expected value of the number of fish caught per fisherman (round "*4 or more"* to 4)

e. Compute the standard deviation of the number of fish caught per fisherman (round "*4 or more"* to 4)