Chapter 6 Multiple Choice Practice

ANSWER KEY

Directions. *Identify the choice that best completes the statement or answers the question. Check your answers and note your performance when you are finished.*

1. A marketing survey compiled data on the number of cars in households. If X = the number of cars in a randomly selected household, and we omit the rare cases of more than 5 cars, then X has the following probability distribution:

X	0	1	2	3	4	5
$P(X)$	0.24	0.37	0.20	0.11	0.05	0.03

What is the probability that a randomly chosen household has at least two cars?

(A) 0.19
(B) 0.20
(C) 0.29
(D) 0.39
(E) 0.61

.20 + .11 + .05 + .03

2. What is the expected value of the number of cars in a randomly selected household?

mean

(A) 2.5
(B) 0.1667
(C) 1.45
(D) 1
(E) Can not be determined

0(.24) + 1(.37) + 2(.20) + 3(.11) + 4(.05) + 5(.03)

3. A dealer in Las Vegas selects 10 cards from a standard deck of 52 cards. Let Y be the number of diamonds in the 10 cards selected. Which of the following best describes this setting?

(A) Y has a binomial distribution with n = 10 observations and probability of success p = 0.25.
(B) Y has a binomial distribution with n = 10 observations and probability of success p = 0.25, provided the deck is shuffled well.
(C) Y has a binomial distribution with n = 10 observations and probability of success p = 0.25, provided that after selecting a card it is replaced in the deck and the deck is shuffled well before the next card is selected.
(D) Y has a geometric distribution with n = 10 observations and probability of success p = 0.25.
(E) Y has a geometric distribution with n = 52 observations and probability of success p = 0.25.

4. In the town of Lakeville, the number of cell phones in a household is a random variable W with the following probability distribution:

Value w_i	0	1	2	3	4	5
Probability p_i	0.1	0.1	0.25	0.3	0.2	0.05

The standard deviation of the number of cell phones in a randomly selected house is
(A) 1.32
(B) 1.7475
(C) 2.5
(D) 0.09
(E) 2.9575

put them into L_1 and L_2 and do 1-var stats with:
List: L_1
FreqList: L_2

5. A random variable Y has the following probability distribution:

Y	-1	0	1	2
$P(Y)$	$4C$	$2C$	0.07	0.03

=1

The value of the constant C is:
(A) 0.10.
(B) 0.15.
(C) 0.20.
(D) 0.25.
(E) 0.75.

$4C+2C+.07+.03=1$
$6C+.1=1$
$6C=.9$ $C=.15$

6. The variance of the sum of two random variables X and Y is
(A) $\sigma_X + \sigma_Y$.
(B) $(\sigma_X)^2 + (\sigma_Y)^2$.
(C) $\sigma_X + \sigma_Y$, but only if X and Y are independent.
(D) $(\sigma_X)^2 + (\sigma_Y)^2$, but only if X and Y are independent.
(E) None of these.

7. It is known that about 90% of the widgets made by Buckley Industries meet specifications. Every hour a sample of 18 widgets is selected at random for testing and the number of widgets that meet specifications is recorded. What is the approximate mean and standard deviation of the number of widgets meeting specifications?
(A) $\mu = 1.62$; $\sigma = 1.414$
(B) $\mu = 1.62$; $\sigma = 1.265$
(C) $\mu = 16.2$; $\sigma = 1.62$
(D) $\mu = 16.2$; $\sigma = 1.273$
(E) $\mu = 16.2$; $\sigma = 4.025$

Since this is a binomial setting:
$\mu_x = np = 18(.90) = 16.2$
$\sigma_x = \sqrt{npq} = \sqrt{18(.90)(.10)} = 1.273$

8. A raffle sells tickets for \$10 and offers a prize of \$500, \$1000, or \$2000. Let C be a random variable that represents the prize in the raffle drawing. The probability distribution of C is given below.

Value c_i	\$0	\$500	\$1000	\$2000
Probability p_i	0.60	0.05	0.13	0.22

The expected profit when playing the raffle is
(A) \$145.
(B) \$585.
(C) \$865.
(D) \$635.
(E) \$485.

mean

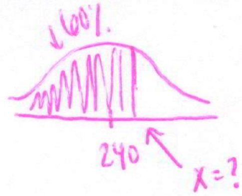
$0(.60) + 500(.05) + 1000(.13) + 2000(.22) = 595$

because the ticket cost \$10 $\;\; -10$

585

9. Let the random variable X represent the amount of money Carl makes tutoring statistics students in the summer. Assume that X is Normal with mean \$240 and standard deviation \$60. The probability is approximately 0.6 that, in a randomly selected summer, Carl will make less than about
(A) \$144
(B) \$216
(C) \$255
(D) \$30
(E) \$360

N(240, 60)



invNorm(.60, 240, 60)

10. Which of the following random variables is geometric?
(A) The number of phone calls received in a one-hour period
(B) The number of times I have to roll a six-sided die to get two 5s.
(C) The number of digits I will read beginning at a randomly selected starting point in a table of random digits until I find a 7.
(D) The number of 7s in a row of 40 random digits.
(E) All four of the above are geometric random variables.

1. D 2. C 3. C 4. A 5. B 6. D 7. D 8. B 9. C 10. C

FRAPPY! Free Response AP® Problem, Yay!

The following problem is modeled after actual Advanced Placement Statistics free response questions. Your task is to generate a complete, concise response in 15 minutes. After you generate your response, view two example solutions and determine whether you feel they are "complete", "substantial", "developing" or "minimal". If they are not "complete", what would you suggest to the student who wrote them to increase their score? Finally, you will be provided with a rubric. Score your response and note what, if anything, you would do differently to increase your own score.

A recent study revealed that a new brand of mp3 player may need to be repaired up to 3 times during its ownership. Let *R* represent the number of repairs necessary over the lifetime of a randomly selected mp3 player of this brand. The probability distribution of the number of repairs necessary is given below.

r_i	0	1	2	3
p_i	0.4	0.3	0.2	0.1

(a) Compute and interpret the mean and standard deviation of *R*. ← put them in L_1 and L_2 and do 1-var stat with List: L_1 and FreqList: L_2

$\mu_R = 1$ We can expect to repair the mp3 player once over its lifetime.

$\sigma_R = 1$ The average number of repairs from the mean that we can expect it to vary.

(b) Suppose we also randomly select a phone that may require repairs over its lifetime. The mean and standard deviation of the number of repairs for this brand of phone are 2 and 1.2, respectively. Assuming that the phone and mp3 player break down independently of each other, compute and interpret the mean and standard deviation of the total number of repairs necessary for the two devices.

if T = total # of repairs and P = # of repairs for the phone

$\mu_T = \mu_R + \mu_P = 1 + 2 = 3$ We can expect to repair the devices 3 times over their lifetimes

$\sigma_T = \sqrt{\sigma_R^2 + \sigma_P^2} = \sqrt{1^2 + 1.2^2} = 1.56$ The average # of repairs from the mean that we can expect it to vary.

(c) Each mp3 repair costs \$15 and each phone repair costs \$25. Compute the mean and standard deviation of the total amount you can expect to pay in repairs over the life of the devices.

$\mu_{cost} = 15(\mu_R) + 25(\mu_P)$
$= 15(1) + 25(2) = \$65$

$\sigma_{cost} = \sqrt{(15(\sigma_R))^2 + (25(\sigma_P))^2}$
$= \sqrt{(15(1))^2 + (25(1.2))^2}$
$= \$33.54$