

CHAPTER 5 FORM C

Name _____ Course Number: _____ Section Number: _____

Directions: Answer the questions in the spaces provided, or attach paper. Circle the correct choice for each response set. If required, show calculations in the blank spaces near the problems.

Provide an appropriate response.

- 1) Anna uses the letter X to represent the possible sequences of heads and tails that can be obtained when a coin is flipped three times. The possible sequences together with their probabilities are listed below:

| X | Probability of sequence X |
|-----|---------------------------|
| HHH | 1/8 |
| HHT | 1/8 |
| HTH | 1/8 |
| HTT | 1/8 |
| THH | 1/8 |
| THT | 1/8 |
| TTH | 1/8 |
| TTT | 1/8 |

Is X a random variable? Why or why not? If it is not, which associated variable is a random variable? Give the probability distribution of the associated random variable.

- 2) Sampling without replacement involves dependent events, so this would not be considered a binomial experiment. Explain the circumstances under which sampling without replacement could be considered independent and, thus, binomial.

Find the mean of the given probability distribution.

- 3) The random variable x is the number of houses sold by a realtor in a single month at the Sendsom's Real Estate office. Its probability distribution is as follows.

| Houses Sold (x) | Probability P(x) |
|-----------------|------------------|
| 0 | 0.24 |
| 1 | 0.01 |
| 2 | 0.12 |
| 3 | 0.16 |
| 4 | 0.01 |
| 5 | 0.14 |
| 6 | 0.11 |
| 7 | 0.21 |

A) $\mu = 3.35$

B) $\mu = 3.50$

C) $\mu = 3.60$

D) $\mu = 3.40$

Provide an appropriate response. Round to the nearest hundredth.

4) A police department reports that the probabilities that 0, 1, 2, and 3 burglaries will be reported in a given day are 0.45, 0.44, 0.09, and 0.02, respectively. Find the standard deviation for the probability distribution. Round answer to the nearest hundredth.

A) $\sigma = 0.52$

B) $\sigma = 0.72$

C) $\sigma = 0.99$

D) $\sigma = 0.98$

Answer the question.

5) Suppose that computer literacy among people ages 40 and older is being studied and that the accompanying table describes the probability distribution for four randomly selected people, where x is the number that are computer literate. Is it unusual to find four computer literates among four randomly selected people?

| x | $P(x)$ |
|-----|--------|
| 0 | 0.16 |
| 1 | 0.25 |
| 2 | 0.36 |
| 3 | 0.15 |
| 4 | 0.08 |

A) Yes

B) No

Assume that a researcher randomly selects 14 newborn babies and counts the number of girls selected, x . The probabilities corresponding to the 14 possible values of x are summarized in the given table. Answer the question using the table.

Probabilities of Girls

| $x(\text{girls})$ | $P(x)$ | $x(\text{girls})$ | $P(x)$ | $x(\text{girls})$ | $P(x)$ |
|-------------------|--------|-------------------|--------|-------------------|--------|
| 0 | 0.000 | 5 | 0.122 | 10 | 0.061 |
| 1 | 0.001 | 6 | 0.183 | 11 | 0.022 |
| 2 | 0.006 | 7 | 0.209 | 12 | 0.006 |
| 3 | 0.022 | 8 | 0.183 | 13 | 0.001 |
| 4 | 0.061 | 9 | 0.122 | 14 | 0.000 |

6) Find the probability of selecting exactly 8 girls.

A) 0.000

B) 0.183

C) 0.122

D) 0.022

Provide an appropriate response.

7) A 28-year-old man pays \$93 for a one-year life insurance policy with coverage of \$70,000. If the probability that he will live through the year is 0.9993, what is the expected value for the insurance policy?

A) \$49.00

B) -\$92.93

C) \$69,951.00

D) -\$44.00

Determine whether the given procedure results in a binomial distribution. If not, state the reason why.

- 8) Spinning a roulette wheel 3 times, keeping track of the occurrences of a winning number of "16".
- A) Procedure results in a binomial distribution..
 - B) Not binomial: the trials are not independent.
 - C) Not binomial: there are more than two outcomes for each trial.
 - D) Not binomial: there are too many trials.

Assume that a procedure yields a binomial distribution with a trial repeated n times. Use the binomial probability formula to find the probability of x successes given the probability p of success on a single trial. Round to three decimal places.

- 9) $n = 11, x = 5, p = 0.5$
- A) 0.293
 - B) 0.338
 - C) 0.226
 - D) 0.031

Find the indicated probability. Round to three decimal places.

- 10) A car insurance company has determined that 9% of all drivers were involved in a car accident last year. Among the 12 drivers living on one particular street, 3 were involved in a car accident last year. If 12 drivers are randomly selected, what is the probability of getting 3 or more who were involved in a car accident last year?
- A) 0.087
 - B) 0.931
 - C) 0.069
 - D) 0.409

Find the indicated probability.

- 11) In a survey of 300 college graduates, 51% reported that they entered a profession closely related to their college major. If 8 of those survey subjects are randomly selected without replacement for a follow-up survey, what is the probability that 3 of them entered a profession closely related to their college major?
- A) 0.210
 - B) 0.101
 - C) 0.790
 - D) 0.133

Find the mean, μ , for the binomial distribution which has the stated values of n and p . Round answer to the nearest tenth.

- 12) $n = 48; p = 3/5$
- A) $\mu = 29.5$
 - B) $\mu = 28.8$
 - C) $\mu = 29.1$
 - D) $\mu = 28.3$

Find the standard deviation, σ , for the binomial distribution which has the stated values of n and p . Round your answer to the nearest hundredth.

- 13) $n = 29; p = 0.2$
- A) $\sigma = 5.42$
 - B) $\sigma = 2.15$
 - C) $\sigma = -0.26$
 - D) $\sigma = 6.27$

Use the given values of n and p to find the minimum usual value $\mu - 2\sigma$ and the maximum usual value $\mu + 2\sigma$. Round your answer to the nearest hundredth unless otherwise noted.

- 14) $n = 1018$, $p = 0.89$
- A) Minimum: 896.04; maximum: 916
 - B) Minimum: 925.99; maximum: 886.05
 - C) Minimum: 891.9; maximum: 920.14
 - D) Minimum: 886.05; maximum: 925.99

Solve the problem.

- 15) The probability is 0.6 that a person shopping at a certain store will spend less than \$20. For groups of size 19, find the mean number who spend less than \$20.
- A) 12.0
 - B) 7.6
 - C) 11.4
 - D) 8.0
- 16) On a multiple choice test with 7 questions, each question has four possible answers, one of which is correct. For students who guess at all answers, find the standard deviation for the number of correct answers.
- A) 1.7
 - B) 1.3
 - C) 13.1
 - D) 1.1

Determine if the outcome is unusual. Consider as unusual any result that differs from the mean by more than 2 standard deviations. That is, unusual values are either less than $\mu - 2\sigma$ or greater than $\mu + 2\sigma$.

- 17) According to AccuData Media Research, 36% of televisions within the Chicago city limits are tuned to "Eyewitness News" at 5:00 pm on Sunday nights. At 5:00 pm on a given Sunday, 2500 such televisions are randomly selected and checked to determine what is being watched. Would it be unusual to find that 958 of the 2500 televisions are tuned to "Eyewitness News"?
- A) Yes
 - B) No
- 18) The Acme Candy Company claims that 8% of the jawbreakers it produces actually result in a broken jaw. Suppose 9571 persons are selected at random from those who have eaten a jawbreaker produced at Acme Candy Company. Would it be unusual for this sample of 9571 to contain 796 persons with broken jaws?
- A) Yes
 - B) No

Use the Poisson Distribution to find the indicated probability.

- 19) The number of calls received by a car towing service averages 14.4 per day (per 24-hour period). After finding the mean number of calls per hour, find the probability that in a randomly selected hour the number of calls is 3.
- A) 0.01185
 - B) 0.01976
 - C) 0.02173
 - D) 0.02470

Find the indicated mean.

20) A certain rare form of cancer occurs in 34 children in a million, so its probability is 0.000034. In the city of Normalville there are 6,014,000 children. A Poisson distribution will be used to approximate the probability that the number of cases of the disease in Normalville children is more than 2. Find the mean of the appropriate Poisson distribution (the mean number of cases in groups of 6,014,000 children).

A) 2040

B) 0.000034

C) 20.4

D) 204

Answer Key

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- 1) No, X is not a random variable because it does not have numerical values. A random variable is a variable that has a single numerical value, determined by chance for each outcome of a procedure. Let Y represent the number of heads (or the number of tails) when a coin is flipped three times. Then Y is a random variable with the distribution shown below.

| Y (number of heads) | Probability |
|-----------------------|-------------|
| 0 | $1/8$ |
| 1 | $3/8$ |
| 2 | $3/8$ |
| 3 | $1/8$ |

- 2) When the sample size is no more than 5% of the total population size, sampling with replacement can be substituted for sampling without replacement.
- 3) C
 - 4) B
 - 5) B
 - 6) B
 - 7) D
 - 8) A
 - 9) C
 - 10) A
 - 11) A
 - 12) B
 - 13) B
 - 14) D
 - 15) C
 - 16) D
 - 17) A
 - 18) B
 - 19) B
 - 20) D