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ernestonyeahialam@gmail.com
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← **TMTH 3360, section 14343 11681, Spring 2023**

Chapter 05 Homework Sections 5.1 and 5.2 (Homework)

🎓 **INSTRUCTOR**
Deanna Dick
University of Houston, TX

Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
POINTS	1/1 ✓	1/1 ✓	1/1 ✓	3/3 ✓	1/1 ✓	1/1 ✓	–/3	–/1	–/1	–/1	–/3	–/5	–/1	–/4	–/10	–/3	–/3	–/1	–/4

◄ ▬▬▬▬▬▬▬▬▬▬ ►

TOTAL SCORE

8/59	**13.6%**

Due Date

TUE, MAR 7, 2023
6:59 AM GMT+1

📅 Request Extension

Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by questions. You are required to use a new randomization after every 3 question submissions.

Assignment Scoring

Your best submission for each question part is used for your score.

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1. **[1/1 Points]** DETAILS PREVIOUS ANSWERS **MENDSTAT15 5.1.002.** 1/6 Submissions Used

MY NOTES ASK YOUR TEACHER

Identify the random variable as either discrete or continuous.

total number of points scored in a football game

- ⦿ discrete
- ◯ continuous ✔

Need Help? Read It

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2. **[1/1 Points]** DETAILS PREVIOUS ANSWERS **MENDSTAT15 5.1.004.** 1/6 Submissions Used

MY NOTES ASK YOUR TEACHER

Identify the random variable as either discrete or continuous.

height of the ocean's tide at a given location

- ◯ discrete
- ⦿ continuous ✔

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3. **[1/1 Points]** DETAILS PREVIOUS ANSWERS **MENDSTAT15 5.1.012.** 1/6 Submissions Used

MY NOTES ASK YOUR TEACHER

Use the probability distribution for the random variable x to answer the question.

x	0	1	2	3	4	5
$p(x)$	0.25	0.2	0.1	0.3	?	0.05

Find $p(4)$.

0.1 ✔

Need Help? Read It

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4. **[3/3 Points]**   DETAILS   PREVIOUS ANSWERS   **MENDSTAT15 5.1.014.**   2/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Use the probability distribution for the random variable x to answer the question.

x	0	1	2	3	4	5
$p(x)$	0.05	0.25	0.15	0.3	0.05	0.2

Find μ, σ^2, and σ. (Round your standard deviation to two decimal places.)

μ = 2.65 ✔

σ^2 = 2.3275 ✔

σ = 1.53 ✔

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5. **[1/1 Points]**   DETAILS   PREVIOUS ANSWERS   **MENDSTAT15 5.1.015.**   1/6 Submissions Used
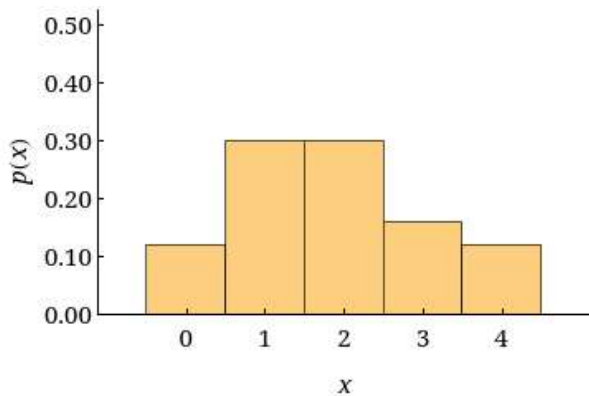
MY NOTES   ASK YOUR TEACHER

Use the probability distribution for the random variable x to answer the question.

x	0	1	2	3	4	5
$p(x)$	0.35	0.19	0.2	0.06	0.17	0.03

Locate the interval $\mu \pm 2\sigma$ on the x-axis of a probability histogram. You are given that the mean is 1.6 and the standard deviation is 1.56. What is the probability that x will fall into this interval?

0.97 ✔

Need Help?   Read It

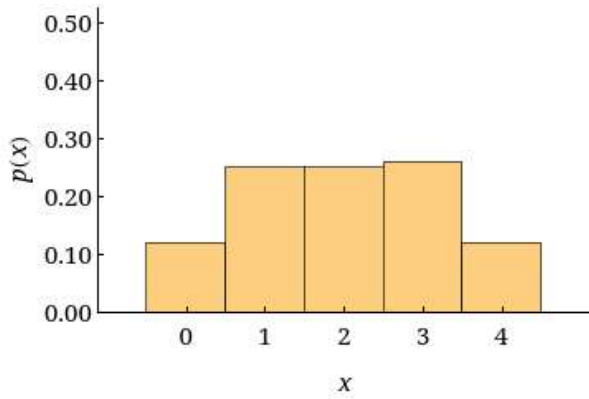6. **[1/1 Points]**   DETAILS   PREVIOUS ANSWERS   **MENDSTAT15 5.1.018.**   1/6 Submissions Used

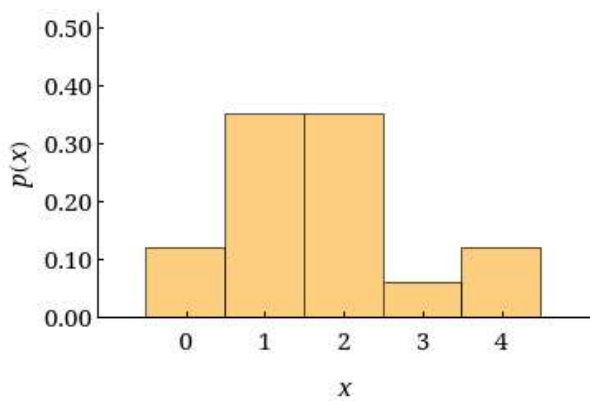MY NOTES   ASK YOUR TEACHER

Use the probability distribution for the random variable x to answer the question.

x	0	1	2	3	4
$p(x)$	0.12	0.25	0.25	0.26	0.12

Construct a probability histogram for $p(x)$.

ⓘ

ⓘ

○

○

✔
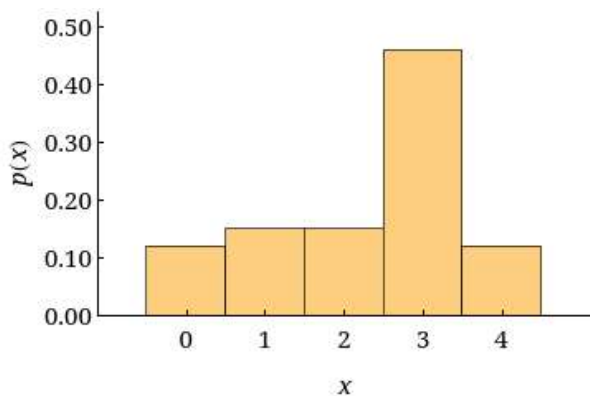
Need Help? [Read It]

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7. **[–/3 Points]**　[DETAILS]　**MENDSTAT15 5.1.019.**　0/6 Submissions Used

[MY NOTES]　[ASK YOUR TEACHER]

Use the probability distribution for the random variable x to answer the question.

x	0	1	2	3	4
$p(x)$	0.12	0.35	0.35	0.06	0.12

Calculate the population mean, variance, and standard deviation. (Round your standard deviation to three decimal places.)

mean   [3.33]

variance   [   ]

standard deviation   [   ]

Need Help? [Read It]

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8. [–/1 Points]   DETAILS   **MENDSTAT15 5.1.020.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Use the probability distribution for the random variable x to answer the question.

x	0	1	2	3	4
$p(x)$	0.12	0.3	0.3	0.16	0.12

What is the probability that x is greater than 2?

[   ]

Need Help?   Read It

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9. [–/1 Points]   DETAILS   **MENDSTAT15 5.1.021.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Use the probability distribution for the random variable x to answer the question.

x	0	1	2	3	4
$p(x)$	0.12	0.3	0.3	0.16	0.12

What is the probability that x is 3 or less?

[   ]

Need Help?   Read It

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10. [–/1 Points]   DETAILS   **MENDSTAT15 5.1.027.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Let x represent the number of times a customer visits a grocery store in a 1-week period. Assume this is the probability distribution of x.

x	0	1	2	3
$p(x)$	0.35	0.15	0.35	0.15

Find the expected value of x, the average number of times a customer visits the store.

[   ] times

Need Help?   Read It

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11. [–/3 Points] | DETAILS | **MENDSTAT15 5.1.034.** 0/6 Submissions Used

MY NOTES | ASK YOUR TEACHER

The maximum patent life for a new drug is 17 years. Subtracting the length of time required by the FDA for testing and approval of the drug provides the actual patent life of the drug—that is, the length of time that a company has to recover research and development costs and make a profit. Suppose the distribution of the lengths of patent life for new drugs is as shown here.

Years, x	3	4	5	6	7	8	9	10	11	12	13
$p(x)$	0.01	0.07	0.07	0.12	0.18	0.20	0.16	0.10	0.05	0.03	0.01

(a) Find the expected number of years of patent life for a new drug.

[   ]

(b) Find the standard deviation of x. (Round your answer to four decimal places.)

[   ]

(c) Find the probability that x falls into the interval $\mu \pm 2\sigma$.

[   ]

Need Help?   [Read It]

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12. [–/5 Points]   DETAILS   MENDSTAT15 5.1.035.   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Most coffee drinkers take a little time each day for their favorite beverage, and many take more than one coffee break every day. The table below, adapted from a certain newspaper, shows the probability distribution for x, the number of coffee breaks taken per day by coffee drinkers.

x	0	1	2	3	4	5
$p(x)$	0.12	0.16	0.37	0.27	0.07	0.01

(a) What is the probability that a randomly selected coffee drinker would take no coffee breaks during the day?

   [   ]

(b) What is the probability that a randomly selected coffee drinker would take more than three coffee breaks during the day?

   [   ]

(c) Calculate the mean and standard deviation for the random variable x. (Round your standard deviation to three decimal places.)

mean   [   ] coffee breaks

standard deviation   [   ] coffee breaks

(d) Find the probability that x falls into the interval $\mu \pm 2\sigma$.

   [   ]

Need Help?   Read It   Watch It

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13. [–/1 Points]   DETAILS   MENDSTAT15 5.2.023.S.   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Evaluate the probability when $n = 9$ and $p = 0.3$. (Round your answer to three decimal places.)

$P(x \leq 1)$

USE SALT

[   ]

You may need to use the appropriate appendix table to answer this question.

Need Help?   Read It

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14. **[–/4 Points]**   **DETAILS**   **MENDSTAT15 5.2.029.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Use Table 1 to evaluate the following probabilities for $n = 6$ and $p = 0.6$. (Round your answers to three decimal places.)

(a) $P(x \geq 4)$

[   ]

(b) $P(x = 2)$

[   ]

(c) $P(x < 2)$

[   ]

(d) $P(x > 1)$

[   ]

You may need to use the appropriate appendix table or technology to answer this question.

Need Help?   [Read It]

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15. **[–/10 Points]** | DETAILS | **MENDSTAT15 5.2.031.**   0/6 Submissions Used

| MY NOTES | | ASK YOUR TEACHER |

Find the mean μ and standard deviation σ for a binomial distribution with $n = 100$ and the following values of p. (Round your answers to two decimal places.)

(a) $p = 0.01$

    μ = [_____]

    σ = [_____]

(b) $p = 0.6$

    μ = [_____]

    σ = [_____]

(c) $p = 0.4$

    μ = [_____]

    σ = [_____]

(d) $p = 0.9$

    μ = [_____]

    σ = [_____]

(e) $p = 0.5$

    μ = [_____]

    σ = [_____]

Need Help?   [Read It]

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16. [–/3 Points]   DETAILS   MENDSTAT15 5.2.034.   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Explain why x is or is not a binomial random variable. (HINT: Compare the characteristics of this experiment with those of a binomial experiment given in this section.)

Two balls are randomly selected *without* replacement from a jar that contains seven red and three white balls. The number x of red balls is recorded.

○ The random variable x is not a binomial random variable since there is an unequal number of red and white balls in the jar. For this reason, the probability p of choosing a red ball changes from trial to trial.

○ The random variable x is a binomial random variable since there is an unequal number of red and white balls in the jar. For this reason, the probability p of choosing a red ball does not change from trial to trial.

○ The random variable x is not a binomial random variable since the balls are selected without replacement. For this reason, the probability p of choosing a red ball changes from trial to trial.

○ The random variable x is a binomial random variable since the balls are selected without replacement. For this reason, the probability p of choosing a red ball does not change from trial to trial.

If the experiment is binomial, give the values of n and p. (If the experiment is not binomial enter NONE.)

n = ⬜

p = ⬜

Need Help?   [Read It]   [Watch It]

17. [–/3 Points]   **DETAILS**   **MENDSTAT15 5.2.035.**   0/6 Submissions Used

MY NOTES   **ASK YOUR TEACHER**

Explain why x is or is not a binomial random variable. (HINT: Compare the characteristics of this experiment with those of a binomial experiment given in this section.)

Two balls are randomly selected *with* replacement from a jar that contains eight red and two white balls. The number x of red balls is recorded.

Explain why x is or is not a binomial random variable.

○ The random variable x is not a binomial random variable since there is an unequal number of red and white balls in the jar. For this reason, the probability p of choosing a red ball changes from trial to trial.

○ The random variable x is not a binomial random variable since the balls are selected with replacement. For this reason, the probability p of choosing a red ball changes from trial to trial.

○ The random variable x is a binomial random variable since the balls are selected with replacement. For this reason, the probability p of choosing a red ball does not change from trial to trial.

○ The random variable x is a binomial random variable since there is an unequal number of red and white balls in the jar. For this reason, the probability p of choosing a red ball does not change from trial to trial.

If the experiment is binomial, give the values of n and p. (If the experiment is not binomial enter NONE.)

n = _____

p = _____

Need Help? [Read It] [Watch It]

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18. [–/1 Points]   **DETAILS**   **MENDSTAT15 5.2.036.**   0/6 Submissions Used

MY NOTES   **ASK YOUR TEACHER**

A meteorologist in Chicago recorded the number of days of rain during a 30-day period. If the random variable x is defined as the number of days of rain, does x have a binomial distribution? If not, why not? If so, are both values of n and p known?

○ Yes, there are n = 30 days so x would have a binomial distribution, but the value of p is not known.

○ Yes, there are 30 days so x would have a binomial distribution, but the values of n and p are not known.

○ Yes, there are 30 days so x would have a binomial distribution, but the value of n is not known.

○ Yes, there are n = 30 days so x would have a binomial distribution, and the values of n and p are known.

○ No, although n = 30 days on which it either rains or does not rain, the trials are not independent.

Need Help? [Read It]

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19. **[–/4 Points]**   DETAILS   **MENDSTAT15 5.2.042.S.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

A new surgical procedure is said to be successful 80% of the time. Suppose the operation is performed five times and the results are assumed to be independent of one another. (Round your answers to three decimal places.)

USE SALT

(a) What is the probability that all five operations are successful?

[   ]

(b) What is the probability that exactly three are successful?

[   ]

(c) What is the probability that less than two are successful?

[   ]

(d) If less than two operations were successful, how would you feel about the performance of the surgical team?

   ○ It would be very unlikely for a team with a success rate of 80% to have fewer than two successful procedures out of five. Therefore, these results would not lead one to question the skill of this surgical team.

   ○ It would be very unlikely for a team with a success rate of 80% to have fewer than two successful procedures out of five. Therefore, these results would lead one to question the skill of this surgical team.

   ○ It would be fairly common for a team with a success rate of 80% to have fewer than two successful procedures out of five. Therefore, these results would not lead one to question the skill of this surgical team.

   ○ It would be fairly common for a team with a success rate of 80% to have fewer than two successful procedures out of five. Therefore, these results would lead one to question the skill of this surgical team.

You may need to use the appropriate appendix table to answer this question.

Need Help? [Read It]

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20. [–/3 Points]   DETAILS   **MENDSTAT15 5.2.044.MI.S.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Suppose that 50% of all young adults prefer McDonald's to Burger King when asked to state a preference. A group of 12 young adults were randomly selected and their preferences recorded. (Round your answers to three decimal places.)

USE SALT

(a) What is the probability that more than 7 preferred McDonald's?

[   ]

(b) What is the probability that between 3 and 7 (inclusive) preferred McDonald's?

[   ]

(c) What is the probability that between 3 and 7 (inclusive) preferred Burger King?

[   ]

You may need to use the appropriate appendix table to answer this question.

Need Help?   Read It   Master It

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21. [–/4 Points]   DETAILS   **MENDSTAT15 5.2.045.S.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Suppose that 3 out of every 10 homeowners in the state of California has invested in earthquake insurance. Suppose 15 homeowners are randomly chosen to be interviewed.

USE SALT

(a) What is the probability that at least one had earthquake insurance? (Round your answer to three decimal places.)

[   ]

(b) What is the probability that four or more have earthquake insurance? (Round your answer to three decimal places.)

[   ]

(c) Based on the empirical rule within what limits would you expect the number of homeowners insured against earthquakes to fall approximately 95% of the time? (Round your answers to the nearest whole number.)

[   ] to [   ]

You may need to use the appropriate appendix table to answer this question.

Need Help?   Read It   Watch It

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22. **[–/3 Points]**   DETAILS   **MENDSTAT15 5.2.048.S.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

Tay-Sachs disease is a genetic disorder that is usually fatal in young children. If both parents are carriers of the disease, the probability that each of their offspring will develop the disease is approximately 0.25. Suppose a husband and wife are both carriers of the disease and the wife is pregnant on five different occasions. If the occurrence of Tay-Sachs in any one offspring is independent of the occurrence in any other, what are the probabilities of these events? (Round your answers to five decimal places.)

USE SALT

(a)   all five children will develop Tay-Sachs disease

☐

(b)   only one child will develop Tay-Sachs disease

☐

(c)   the fifth child will develop Tay-Sachs disease, given that the first four did not

☐

You may need to use SALT to answer this question.

Need Help?   Read It

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23. **[–/1 Points]**   DETAILS   **MENDSTAT15 5.2.050.S.**   0/6 Submissions Used

MY NOTES   ASK YOUR TEACHER

In a certain population, 66% of the people have Rh-positive blood. Suppose that two people from this population marry. What is the probability that they are both Rh-negative, thus making it inevitable that their children will be Rh-negative?

USE SALT

☐

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