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← TMTH 3360, section 14343 11681, Spring 2023

Chapter 05 Homework Section 5.3 (Homework)

INSTRUCTOR
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Current Score

QUESTION	1	2	3	4	5	6	7	8	9	10	11
POINTS	–/4	–/4	–/5	–/3	–/1	–/3	–/3	–/3	–/3	–/3	–/2

TOTAL SCORE

–/34	0.0%

Due Date

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

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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. **[–/4 Points]** DETAILS **MENDSTAT15 5.3.003.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

Let x be a Poisson random variable with $\mu = 4.5$. Find the probabilities for x using the Poisson formula. (Round your answers to six decimal places.)

$P(x = 0)$

$P(x = 1)$

$P(x = 2)$

$P(x \leq 2)$

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2. **[–/4 Points]** DETAILS **MENDSTAT15 5.3.006.MI.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

Let x be a Poisson random variable with $\mu = 2$. Find the probabilities for x using Table 2. (Round your answers to three decimal places.)

$P(x \leq 3)$

$P(x > 3)$

$P(x = 3)$

$P(3 \leq x \leq 5)$

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

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3. **[–/5 Points]** DETAILS **MENDSTAT15 5.3.010.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

Let x be a binomial random variable with $n = 25$ and $p = 0.05$.

Calculate $p(0)$ and $p(1)$ using Table 1 to obtain the exact binomial probability. (Round your answers to three decimal places.)

$p(0) =$ ____

$p(1) =$ ____

Calculate $p(0)$ and $p(1)$ using the Poisson approximation. (Round your answer to three decimal places.)

$p(0) =$ ____

$p(1) =$ ____

Compare your results. Is the approximation accurate?

- ○ No the approximation is not accurate. At least one the differences between the probabilities from the Poisson approximation and the exact probabilities from the binomial distribution is much greater than 0.05.
- ○ Yes the approximation is reasonably accurate. In general, the probabilities from the Poisson approximation are all well within 0.05 of the exact probabilities from the binomial distribution.

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

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4. **[–/3 Points]** DETAILS **MENDSTAT15 5.3.012.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

The number of bankruptcies filed in the district court has a Poisson distribution with an average of 6 per week.

(a) What is the probability that there will be no bankruptcy filings during a given week? (Round your answer to three decimal places.)

(b) What is the probability that there will be at least one bankruptcy filing during a given week? (Round your answer to three decimal places.)

(c) Within what limits does Tchebysheff's Theorem suggest you would expect to see the number of bankruptcy filings per week at least 88.88% of the time? (Round your answer up to the nearest whole number.)

0 to _____ filings

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

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5. **[–/1 Points]** DETAILS **MENDSTAT15 5.3.017.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

The probability that a person will develop the flu after getting a flu shot is 0.03. In a random sample of 100 people in a community who got a flu shot, what is the probability that 2 or more of the 100 people will get the flu? Use the Poisson approximation to binomial probabilities to find your answer. (Round your answer to three decimal places.)

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

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6. **[–/3 Points]** DETAILS **MENDSTAT15 5.3.018.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

The increased number of small commuter planes in major airports has heightened concern over air safety. An eastern airport has recorded a monthly average of five near misses on landings and takeoffs in the past 5 years. (Round your answers to three decimal places.)

(a) Find the probability that during a given month there are no near misses on landings and takeoffs at the airport.

(b) Find the probability that during a given month there are six near misses.

(c) Find the probability that there are at least six near misses during a particular month.

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

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7. **[–/3 Points]** DETAILS **MENDSTAT15 5.3.019.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

The number x of people entering the intensive care unit at a particular hospital on any one day has a Poisson probability distribution with mean equal to eight persons per day.

(a) What is the probability that the number of people entering the intensive care unit on a particular day is four? (Round your answer to three decimal places.)

What is the probability that the number of people entering the intensive care unit on a particular day is less than or equal to four? (Round your answer to three decimal places.)

(b) Is it likely that x will exceed 14? Explain.

- ○ Yes, x is less than 2 standard deviations above the mean.
- ○ No, x is more than 2 standard deviations above the mean.

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

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8. **[–/3 Points]** DETAILS **MENDSTAT15 5.3.020.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

According to a study conducted by a university, children who are injured seven or more times tend to sustain these injuries during a relatively limited time, usually 1 year or less. If the average number of injuries per year for school-age children is seven, what are the probabilities of these events? (Round your answers to three decimal places.)

(a) a school-age child will sustain seven injuries during the year

(b) a school-age child will sustain seven or more injuries during the year

(c) a school-age child will sustain at most one injury during the year

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

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9. **[–/3 Points]** DETAILS **MENDSTAT15 5.3.021.MI.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

According to a study conducted by a university, children who are injured five or more times tend to sustain these injuries during a relatively limited time, usually 1 year or less. Let the average number of injuries per year for school-age children be five.

(a) Calculate the mean and standard deviation for x, the number of injuries per year sustained by a school-age child. (Round your answers to three decimal places.)

μ = _____ injuries

σ = _____ injuries

(b) According to Tchebysheff's Theorem, within what limits would you expect the number of injuries per year to fall at least three-quarters of the time? (Round your answer up to the nearest whole number.)

0 injuries to _____ injuries

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10. **[–/3 Points]** DETAILS **MENDSTAT15 5.3.022.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

If a drop of water is examined under a microscope, the number x of a specific type of bacteria present has been found to have a Poisson probability distribution. Suppose the maximum permissible count per water specimen for this type of bacteria is seven. If the mean count for your water supply is three and you test a single specimen, is it likely that the count will exceed the maximum permissible count? Explain. (Round your bacteria value up to the nearest whole number, and round your probability to three decimal places.)

---Select--- , according to Tchebysheff's Theorem, at least three-quarters of the observations should fall between 0 bacteria and _____ bacteria present, inclusive, and the exact Poisson probability is $P(x > 7)$ = _____ .

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

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11. **[–/2 Points]** DETAILS **MENDSTAT15 5.3.023.** 0/6 Submissions Used

MY NOTES ASK YOUR TEACHER

An outbreak of *E. coli* infections in July of 2017 occurred in southwestern Utah, with a dozen people sick, and the confirmed deaths of two children. *E. coli* infections and outbreaks have been on the rise since 2009, reaching an incidence rate of 2.85 cases per 100,000 persons.† Children under the age of five have a higher incidence rate—7.86 cases per 100,000. Using the rate of 2.85 cases per 100,000, evaluate the following probabilities. (Round your answers to three decimal places.)

(a) What is the probability that at most three outbreaks per 100,000 are reported across the United States this year?

(b) What is the probability that more than four outbreaks per 100,000 are reported across the United States this year?

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

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