

University of Puerto Rico at Aguadilla
Department of Mathematics
Statistic with Programming skills Math 3026
Examination III

Name _____
Student ID. _____
Section: _____

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Instructions: Complete the following exercises in a clear and specific, use Minitab. Value 5pts each part.

1. According to government data, 35% of working women have never been married, choosing a random sample of 15 women workers. What is the probability that

a) Exactly 3 of them have never been married?

b) At most 5 of them have never been married?

c) At least 7 of them have been married?

2. In his doctoral thesis, L. A. Beckel (University of Minnesota, 1982) studied the social behavior of river otters during the mating season. An important role in the bonding process of river otters is very short periods of social grooming. After extensive observations, Dr. Beckel found that one group of river otters under study had a frequency of initiating grooming of approximately 2.1 for each 10 minutes. Suppose that you are observing river otters for 30 minutes. Let $r = 0, 1, 2, \dots$ be a random variable that represents the number of times (in a 30-minute interval) one otter initiates social grooming of another.
(a) What is λ ? (Use 2 decimal places.)

(b) Find the probabilities that in your 30 minutes of observation, one otter will initiate social grooming four times, and six times.

(c) Find the probability that one otter will initiate social grooming four or more times during the 30-minute observation period.

(d) Find the probability that one otter will initiate social grooming less than four times during the 30-minute observation period.

4. Susan is taking Western Civilization this semester on a pass/fail basis. The department teaching the course has a history of passing 60% of the students in Western Civilization each term. Let $n = 1, 2, 3, \dots$ represent the number of times a student takes Western Civilization until the *first* passing grade is received. (Assume the trials are independent.)

(a) What is the probability that Susan passes on the first try ?

(b) What is the probability that Susan first passes on the second try ?

(c) What is the probability that Susan needs three or more tries to pass Western Civilization?

(d) What is the expected number of attempts at Western Civilization Susan must make to have her (first) pass? *Hint:* Use μ for the geometric distribution and round.

5. *USA Today* reported that approximately 25% of all state prison inmates released on parole become repeat offenders while on parole. Suppose the parole board is examining five prisoners up for parole. Let x = number of prisoners out of five on parole who become repeat offenders.

x	0	1	2	3	4	5
$P(x)$	0.211	0.379	0.220	0.170	0.019	0.001

(a) Find the probability that one or more of the five parolees will be repeat offenders.

(b) Find the probability that two or more of the five parolees will be repeat offenders.

(c) Find the probability that four or more of the five parolees will be repeat offenders.

(d) Compute μ , the expected number of repeat offenders out of five.

6. Porphyrin is a pigment in blood protoplasm and other body fluids that is significant in body energy and storage. Let x be a random variable that represents the number of milligrams of porphyrin per deciliter of blood. In healthy circles, x is approximately normally distributed with mean $\mu = 43$ and standard deviation $\sigma = 9$. Find the following probabilities. (Round your answers to four decimal places.)

(a) x is less than 60

(b) x is greater than 16

(c) x is between 16 and 60

(d) x is more than 60 (This may indicate an infection, anemia, or another type of illness.)

(e) Find the lower 10% and the upper 90% values and explain the meaning.

7. Raul received a score of 74 on a history test for which the class mean was 70 with a standard deviation of 5. He received a score of 71 on a biology test for which the class mean was 70 with standard deviation 4. On which test did he do better relative to the rest of the class?

8. Consider the following diagram. Explain if is under control or not and why?

