

Statistics Checkpoint Assignment #3

Version C

Directions:

- Watch the Checkpoint Assignment #3 Overview Video
- Do not place any solutions on the actual checkpoint assignment paper.
- Show all work and solutions on your own notebook paper.
- Only write on the front side of the notebook paper.
- Use plenty of spacing and dark print to make sure the paper is legible, follow the directions indicated for each problem or set of problems.

1. State whether the variable is discrete or continuous.

- The number of goals scored in a soccer game.
- The age of the oldest student in a statistics class.
- The speed of a car on a Los Angeles freeway during rush hour traffic.
- The price of a gallon of regular unleaded gasoline.
- The blood pressure of a student the day before his final exam.

2. Determine whether the distribution represents a probability distribution. If not, identify the requirement that is not satisfied.

a)

x	P(x)
1	-0.3
2	0.5
3	0.1
4	0.3
5	0.1

b)

x	P(x)
0	0.2
1	0.5
2	0.1
3	0.15
4	0.05

3. Maggie is a social worker. For the last 225 days she has recorded her client caseload per day. The results are in the accompanying table. In this problem x is the number of clients Maggie sees per day and the frequency is the number of days on which she sees x clients. **(show all work)**

x	0	1	2	3	4	5
Frequency	4	12	25	54	55	75

- Find the probability distribution for this data (round four decimal place).
- Find the expected number (mean) of clients Maggie sees per day (round one decimal place).
- Find the standard deviation for this distribution (round one decimal place).
- Find the probability that Maggie will see at least 3 clients per day (round four decimal place).
- Find the probability that Maggie will see no more than 1 client per day (round four decimal place).
- Construct a probability histogram for this distribution.

Use technology (Calculator, StatCrunch, or Excel) to complete problems 4-7.

4. A multiple-choice test has ten questions, each with three choices for the answer. Only one of the choices is correct. You randomly guess the answer to each of the questions. **(round 3 decimal places)**

- Find the probability that you answer two of the questions correctly.
- Find the probability that you answer at most 2 of the questions correctly.

5. Thirty percent of all automobiles undergoing an emissions inspection at a certain inspection station fail the inspection. In a random sample of 15 selected cars: **(round 3 decimal places)**

- Find the probability that at most five of the cars fail the inspection.
- Find the probability that at least three of the cars fail the inspection.
- Find the probability that all 15 of the cars fail the inspection.

6. Twenty-five percent of the customers of a grocery store use an express checkout. In a random survey of ten customers: **(round 3 decimal places)**

- Find that probability that no more than two uses express checkout.
- Find the probability that at least 8 use express checkout.
- Find the probability that exactly half of the sample use express checkout.
- Find the expected number (mean) of the number that use express checkout.
- Find the standard deviation of the number that use express checkout.

7. College Score Card

A study is to be completed using 20 randomly selected colleges from the SACS-COC regions where p represents the probability of selecting a private for-profit college. **(round 3 decimal places and show all work)**

- Find the probability of randomly selecting a private for-profit college from the full data set: $p = \underline{\hspace{1cm}}$ (Hint: Sort the data and determine the number of private for-profit colleges out of the total sample size to determine p)
- Find the probability that none of the 20 randomly selected colleges are private for-profit colleges.
- Find the probability that at least one of the 20 randomly selected colleges are private for-profit colleges.
- Describe the relationship between the results of b) and c).
- Find the probability that fewer than 5 of the 20 randomly selected colleges are private for-profit colleges.
- Would it be considered statistically unusual if exactly 5 out of the 20 randomly selected colleges are found to be private for-profit colleges? Compute the probability and explain why.

8. For each of the following probabilities: **(show all work)**

- convert the raw score to a standard score **(round 2 decimal places)**
- shade the area under the standard normal curve corresponding to the probability
- find the probability **(round 4 decimal places)**

a) $P(18 \leq x \leq 36); \mu = 27, \sigma = 3$

b) $P(15 \leq x); \mu = 12, \sigma = 1.5$

c) $P(x \leq 13.5); \mu = 15, \sigma = 2.5$

9. Find the z value so that: **(show all work)**

- 95% of the area of the standard normal curve lies between $-z$ and z .
- 18% of the area of the standard normal curve lies to the right of z .
- 34% of the area of the standard normal curve lies to the left of z .

10. The distribution of cholesterol levels in teenage boys is approximately normal with a mean of 170 and a standard deviation of 30 (Source: U.S. National Center for Health Statistics). Levels above 200 warrant attention. **(show all work)**

- What is the probability that a teenage boy has a cholesterol level greater than 200?
- What is the probability a teenage boy has a cholesterol level between 165 and 225?
- Assume that a pediatrician's office has 125 teenage boys as patients, how many of these boys will have cholesterol levels below 160?

11. The operating life on a “Play All Day” video game is normally distributed with a mean of 48 months and a standard deviation of 6 months. The manufacturer will replace any games that malfunction during the guarantee period. **(show all work)**
- a) How long should the guarantee period run if the manufacturer does not want to replace more than 6% of the games?
12. The heights of women are normally distributed with a mean of 63.6 inches and a standard deviation of 2.5 inches. **(show all work)**
- a) If an individual woman is randomly selected, what is the probability that she has a height between 63 and 65 inches?
- b) If 100 women are randomly selected, find the probability that they have a mean height greater than 64 inches.
- c) If 75 women are randomly selected, find the probability that they have a mean height less than 62.1 inches.
- d) To be considered extremely tall, a woman’s height must fall in the top 2% for all heights of women. What is the benchmark height for this designation?
- e) To be considered extremely short, a woman’s height must fall in the bottom 2% for all heights of women. What is the benchmark height for this designation?
13. Assume that the salaries of elementary school teachers in the United States are normally distributed with a mean of \$31,000 and a standard deviation of \$3,000. **(show all work)**
- a) Find the probability that the mean salary of 100 randomly selected elementary school teachers in the United States is less than \$30,500.
- b) Find the probability that the mean salary of 50 randomly selected elementary school teachers in the United States is greater than \$31, 800.
- c) Find the probability that the mean salary of 80 randomly selected elementary school teachers in the United States is between \$30,000 and \$32,000.
14. James Smith is a weld inspector at a shipyard. He knows from keeping track of good and substandard welds that for the afternoon shift 5% of all welds done will be substandard. If Smith checks 300 of the 8000 welds completed during the afternoon shift: **(show all work)**
- a) What is the probability that he will find less than 25 substandard welds?
- b) What is the probability that he will find between 5 and 25 substandard welds?
- c) What is the probability that he will find 35 or more substandard welds?