

Winter 2016 FORM A Name Last: _____ First: _____

Exam 2: Chapters 4, 5, 6, 7 Class Time: _____

Directions:

- Print your **NAME** and **CLASS TIME** on **THIS EXAM**
 - Print your **NAME** and **CLASS TIME** on your **SCANTRON**.
 - Write **FORM A** on your **SCANTRON**.
 - Turn your cell phone **OFF**. Any noise from a cell phone will signal that your exam is over.
 - Each question has exactly one **BEST** answer. There are 21 questions.
 - You may write on this exam. There is no scratch paper allowed.
 - Each question is worth 5 points for a total of 105 points.
 - **If you have no note page**, you must write **NO NOTES** on your **SCANTRON**.
 - Put your **SCANTRON** and **PAGE** of **NOTES** inside your **EXAM**. Before you start packing up your things, turn in your **EXAM** and **SCANTRON**. Then go back to your desk to pack up your materials. When your exam is returned, you will get back all your materials.
 - **FAILURE TO FOLLOW ALL INSTRUCTIONS WILL COST YOU 5 POINTS!**
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1. Suppose you play a game with a fair 12-sided die; each side shows one of the numbers 1 through 12.
- If you roll a 2, 4 or 8 you win \$8.
 - If you roll a 10 or 12 you win \$6.
 - If you roll anything else you lose \$10.

If you played this game over and over, your expected average winnings per game would be:

- A. \$4.00 B. -\$0.33 C. \$8.00 D. -\$2.83

Questions 2 – 3 refer to the following:

Let X follow the Exponential Distribution with a **decay rate** of 0.4.

2. Which of the following statements are true about the distribution of X ?

- I. The graph of the distribution is skewed left.
- II. The graph of the distribution is skewed right.
- III. The median is greater than the mean.
- IV. X takes on the values $-\infty$ to ∞ .

- A. II only B. I and III only C. II and IV only D. I only

3. Suppose that random samples of size 36 were drawn from the above distribution and the average of each sample was calculated. Which of the following is/are true about the distribution of sample averages?

- I. The sample average will be approximately 0.4.
- II. The sample average will be approximately 2.5.
- III. The sample standard deviation will be approximately 2.5.
- IV. The sample standard deviation will be approximately 0.42.

- A. I and III only B. II and III only C. II only D. II and IV only

Questions 4 – 5 refer to the following:

At a factory, soft drink bottles are filled with soda. The amount of soda in the bottles is normally distributed with mean of 1.3 liters and a standard deviation of 0.07 liters.

4. What proportion of the bottles contain between 0.98 and 1.25 liters?

- A. 0.7625 B. 0.2375 C. 2.077 D. 0.7923

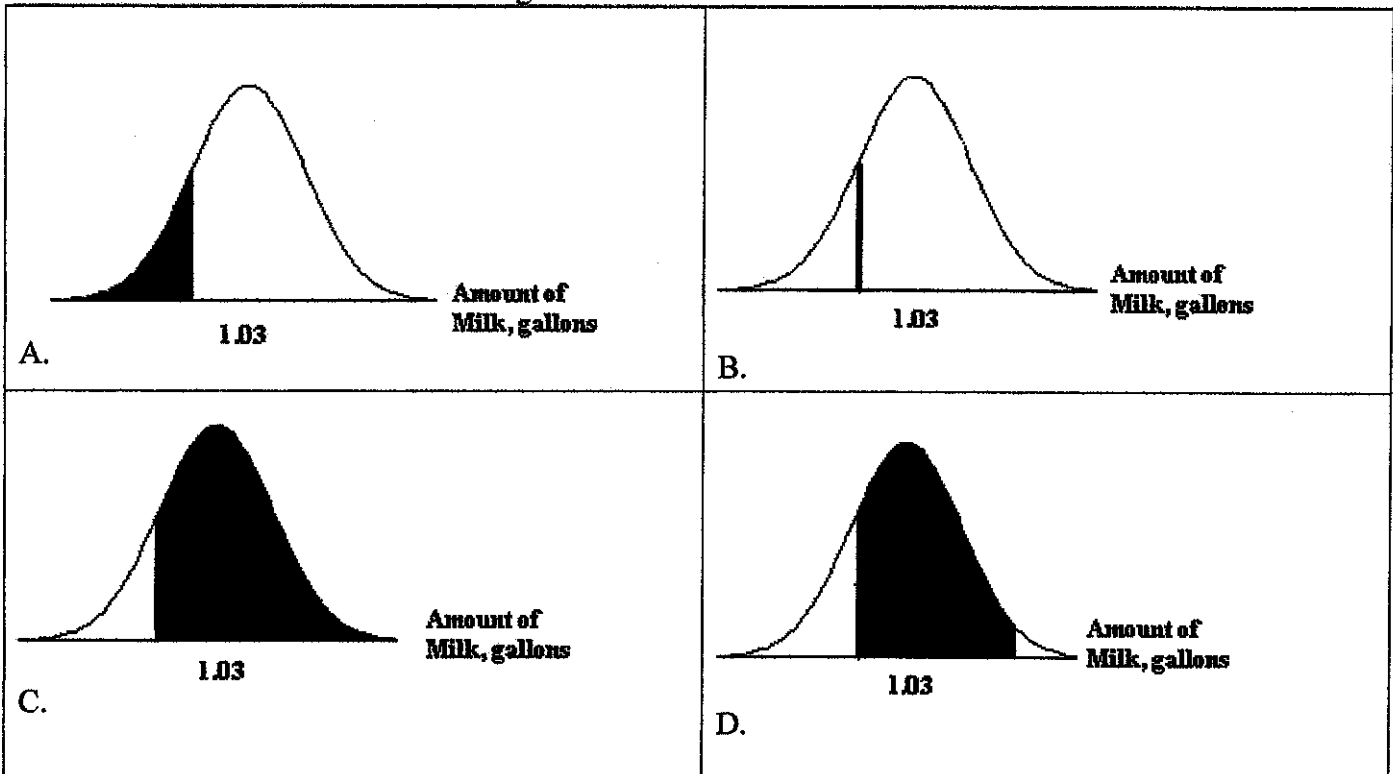
5. The fullest 15% of bottles at this factory are filled with at least how much soda per bottle at this factory?

- A. 1.3726 liters B. 1.2274 liters C. 1.9500 liters D. 1.2095 liters

6. For continuous distributions that are skewed left with a mean = 12 and a standard deviation = 9, what will be the approximate distribution for \bar{X} , when samples of size 196 are taken and averaged together?

- A. Mean = 12, Standard Deviation = $9/14$, Distribution skewed left
B. Mean = 12, Standard Deviation = $9/196$, Distribution skewed left
C. $N(12, 9/14)$
D. $N(12, 9/196)$

7. The filling machine in a dairy fills one-gallon containers of milk. The amount of milk in a one-gallon container follows a normal distribution with a mean of 1.03 gallons and a standard deviation of 0.05 gallons. Which graph shades the area representing the probability that a randomly selected one-gallon container of milk contains at least one gallon of milk?



Questions 8 - 9 refer to the following:

Suppose a radar system was set up to monitor the speed in miles per hour of all cars traveling on Stevens Creek. Assume that during the monitoring, 905 cars passed the radar system with 123 of the cars traveling at the speed limit or less. 782 of the cars traveling faster than the speed limit.

Suppose we randomly select 15 cars.

Let X = the number of cars that traveled at the speed limit or less on Stevens Creek.

8. The distribution of X is:

- A. $U(0, 15)$ B. $N(15, 123)$ C. $B(15, 123/905)$ D. $N(123/905, 1.35)$

9. Which has the highest probability of happening?

- A. Exactly 3 of the cars will have traveled at the speed limit or less on Stevens Creek.
B. Less than 3 of the cars will have traveled at the speed limit or less on Stevens Creek.
C. More than 3 of the cars will have traveled at the speed limit or less on Stevens Creek.
D. Not enough information is given to determine.

10. House prices generally follow a distribution that is skewed to the right. Which of the following statements is/are true about the distribution of average house prices, when sampling 30 houses at a time?

- I. The distribution of average prices is the same as for individual house prices.
II. The distribution of average prices has a smaller standard deviation than the distribution of individual house prices.
III. The distribution of average prices has a higher mean than the distribution of individual prices.
- A. II only B. I and III only C. II and III only D. III only

Questions 11 - 12 refer to the following:

Suppose 1 in 7 people entering a local hospital need blood. Random surveys of 18 people entering hospitals are done. We are interested in the number of people needing blood.

11. For random surveys of 18 people entering hospitals, which is the closest long-term average of how many people need blood?

- A. 1.8 B. 2.6 C. 3.4 D. 5.7

12. In one random survey of 18 people entering a hospital, find the probability that at most 4 people need blood.

- A. 0.1026 B. 0.7501 C. 0.2499 D. 0.8974

Questions 13 – 16 refer to the following:

The weather on a tropical island in January is fairly constant. Records indicate that the high temperatures for each day of the month tend to have a uniform distribution over the interval from 75°F to 90°F. A tourist arrives on the island on a randomly selected day in January.

13. Find the probability that the temperature will be above 80°F.

- A. 0.6667 B. 0.3337 C. 0.8889 D. 0.9375

14. Find the interquartile range of temperatures.

- A. 3.75°F B. 7.5°F C. 15°F D. 30°F

15. Interpret the 70th percentile.

- A. 70% of temperatures will be at least 85.5°F.
- B. 70% of temperatures will be at most 85.5°F.
- C. 70% of temperatures will be at least 79.5°F.
- D. 70% of temperatures will be at most 79.5°F.

16. Suppose data are collected for a random sample of 25 days. Find the distribution for the average high temperature for the 25 days in the sample.

- A. U (82.5, 4.33) B. N(82.5, 4.33) C. N(82.5, 0.87) D. U(82.5, 0.87)

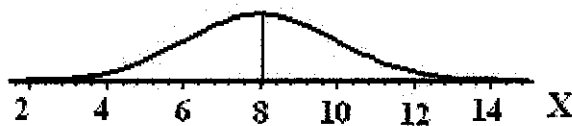
17. Huey, Dewey, and Louie participated in races in different winter sports.

Below are each person’s time, and the average time and standard deviation for all racers in her race. Who did the best in her own race as compared to the other racers participating in their own races?

| Race | Racer | Time (minutes) | Average Time μ for all racers in this race | Standard Deviation σ for all racers in this race |
|-----------------|-------|----------------|--|---|
| Downhill Skiing | Huey | 4.5 | 4.0 | 0.5 |
| Snowshoeing | Dewey | 6.3 | 6.0 | 0.4 |
| Snowboarding | Louie | 3.8 | 3.5 | 0.6 |

- A. Huey B. Dewey C. Louie D. All performed the same

18. Find the standard deviation of the following graph.



- A. 8 B. 6 C. 4 D. 2

Questions 19 – 21 refer to the following:

After bacteria are subjected to a certain drug, the length of time until the bacteria die follows an exponential distribution with a **mean** of one-half hour.

19. Find the probability that the time it takes for the bacteria to die is between 0.2 and 1 hour.

- A. 0.6703 B. 0.2983 C. 0.9050 D. 0.5350

20. Which of the following statements is/are true about the length of time until the bacteria die?

- I. The mean lifetime of the bacteria is less than the median lifetime of the bacteria.
- II. The mean and the standard deviation are the same.
- III. The distribution is not symmetrical.

- A. I, II and III B. I and II only C. II and III only D. I and III only

21. 20% of the bacteria that take the longest to die will last at least how long?

- A. 0.80 hr B. 0.62 hr C. 0.73 hr D. 0.11 hr

Answer Key:

| Question | Form A | Form B |
|----------|--------|-------------------|
| 1 | D | A |
| 2 | A | B |
| 3 | D | B |
| 4 | B | C |
| 5 | A | B |
| 6 | C | D |
| 7 | C | C |
| 8 | C | D |
| 9 | B | B |
| 10 | A | A |
| 11 | B | C |
| 12 | D | B |
| 13 | A | A |
| 14 | B | D |
| 15 | B | C |
| 16 | C | A |
| 17 | C | D |
| 18 | D | D |
| 19 | D | C |
| 20 | C | A |
| 21 | A | C |
| | | |
| A | 5 | |
| B | 5 | |
| C | 6 | |
| D | 5 | |

Exam 2