



3. At a certain location the carbon monoxide levels (in  $\text{mg}/\text{m}^3$ ) in the atmosphere follow an unknown distribution with an average of 7.4 and a standard deviation of 2.4. Find the probability that for a random sample of 30 test measurements, the sample average carbon monoxide level is more than 7.2.
- A. 0.3240      B. 0.6760      C. 0.4658      D. Not possible to determine
4. Suppose you play a game in which you win \$5 with a probability of 0.25 and you lose \$2 with a probability of 0.75. If you play this game 100 times, what is the expected total gain or loss for 100 games?
- A. \$2.50 gain      B. \$1.50 loss      C. \$ 150 gain      D. \$25 loss

**Questions 5 - 7 refer to the following:**

Suppose that the amount of time that it takes a student to complete an online quiz is uniformly distributed between 20 and 36 minutes.

5. Find the probability that it takes one student less than 26 minutes to complete this online quiz.
- A. 0.3750      B. 0.7222      C. 0.7692      D. 0.1667
6. Find the 60<sup>th</sup> percentile of completion times (in minutes) for the online quiz.
- A. 33.6      B. 29.6      C. 24.4      D. 21.6
7. What is the appropriate probability distribution for the sample mean time to complete the online quiz for samples of 40 students?
- A.  $N(28, 4.62)$       B.  $U(28, 0.73)$       C.  $U(28, 0.12)$       D.  $N(28, 0.73)$
8. Which of the following distributions are skewed right?
- I.  $X \sim \text{Exp}(0.35)$       II.  $X \sim N(5, 2)$       III.  $X \sim U(0, 10)$
- A. I only      B. II only      C. III only      D. I and III
9. Which of the following is true?
- A. If  $X \sim \text{Exp}(1/10)$ , then  $P(X = 10) = 1/10$
- B. The probability distribution for sample means is the same as the probability distribution for the individuals in the population.
- C. If  $f(x) = 0.10$  on the interval  $[2, 12]$  for a continuous probability distribution, then the distribution is Uniform.
- D. Both B and C are true.

10. Suppose  $X \sim N(2.5, 0.3)$ . We are interested in the probability distribution of the sample mean  $\bar{X}$  for a sample of size  $n$ . Which of the following is true?
- A. If the sample size  $n$  is increased, the average of the sample means increases.
  - B. If the sample size  $n$  is increased, the standard deviation of the sample means decreases.
  - C. If the sample size  $n$  is increased, both the average and standard deviation of the sample means remain unchanged.
  - D. None of the above is true.
11. For the binomial distribution, which one of the following is true?
- A. We conduct as many repeated trials as needed to obtain a specified number of successes.
  - B. The outcome of each trial is affected by the outcomes of the trials before it.
  - C. The probability of success must be the same for all trials.
  - D. B and C are both true.

**Questions 12 - 13 refer to the following:**

(Data from Pew Research Center <http://www.people-press.org/2014/06/26/section-7-global-warming-environment-and-energy/>)

61% of the American public say there is solid evidence that the average temperature on Earth has been getting warmer over the past few decades.

Suppose that a random sample of 18 members of the American public is selected.

12. Find the probability that more than 12 people in the sample will believe that the average temperature on Earth has been getting warmer over the past few decades.
- A. 0.4079
  - B. 0.5921
  - C. 0.7655
  - D. 0.2345
13. On average, how many people in the sample do we expect will believe that the average temperature on Earth has been getting warmer over the past few decades.
- A. 7.02
  - B. 6.3
  - C. 10.98
  - D. 9.0

**Questions 14 - 16 refer to the following:**

A ski area has an information hotline that skiers can call to check on snow conditions. On a holiday weekend in February, the time between phone calls to the ski hotline follows an exponential distribution with a mean of 2.5 minutes.

14. The value of the decay parameter is
- A. 1.5                      B. 0.40                      C. 0.50                      D. 2.5
15. Find the probability that the time between phone calls is less than 4 minutes.
- A. 0.7981                      B. 0.2019                      C. 0.4647                      D. 0.5353
16. Find the 75th percentile (in minutes) for the time between phone calls.
- A. 3.47                      B. 2.77                      C. 0.72                      D. 0.58
17. The binomial distribution is appropriate for which of the following situations:
- A. Counting the number of occurrences of an event in a fixed interval of time
- B. Counting the number of trials needed to obtain the first occurrence of a success
- C. Counting the number of success in a fixed number of independent trials
- D. Finding the probability of waiting for  $X$  minutes for an event to occur

**Questions 18 - 21 refer to the following:**

A biologist studying a certain type of insect finds that the length of the insect follows a normal probability distribution with a mean of 2.1 cm and a standard deviation of 0.18 cm.

18. Find the interval for the **middle 80%** of lengths for this insect (*to the nearest hundredth of a cm*).

- A. 1.95 cm to 2.25 cm
- B. 1.74 cm to 2.46 cm
- C. 1.92 cm to 2.28 cm
- D. 1.87 cm to 2.33 cm

19. Find the probability that an insect is **at most 2 cm** in length.

- A. 0.2893      B. 0.7107      C. 0.3562      D. 0.6438

20. 30% of insects are at least how long?

Find the value and select the answer with the most appropriate interpretation as a percentile:

- A. 30% of insects are at most 2.19 cm long
- B. 70% of insects are at most 2.19 cm long
- C. 30% of insects are at most 2.01 cm long
- D. 70 % of insects are at most 2.01 cm long

21. Which of the two events listed below is more likely?

The length of an individual insect is between 1.9 cm and 2.3 cm.

The average length for a sample of 10 insects is between 1.9 cm and 2.3 cm.

- A. Both are equally likely.
- B. It is more likely that the length of individual insect is between 1.9 cm and 2.3 cm.
- C. It is more likely that the average length for a sample of 10 insects is between 1.9 cm and 2.3 cm.
- D. Impossible to determine

Math 10 Spring 2015 **FORM B** Name Last: \_\_\_\_\_ First: \_\_\_\_\_  
Exam 2: Chapters 4,5,6,7 Class Time: \_\_\_\_\_

- Print your **NAME** and **CLASS TIME** on **THIS EXAM**
  - Print your **NAME** and **CLASS TIME** on your **SCANTRON**.
  - Write **FORM B** 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!**
- 

**Questions 1 - 3 refer to the following:**

A ski area has an information hotline that skiers can call to check on snow conditions. On a holiday weekend in February, the time between phone calls to the ski hotline follows an exponential distribution with a mean of 2.5 minutes.

1. The value of the decay parameter is  
A. 1.5                      B. 0.40                      C. 0.50                      D. 2.5
2. Find the probability that the time between phone calls is less than 4 minutes.  
A. 0.7981                      B. 0.2019                      C. 0.4647                      D. 0.5353
3. Find the 75th percentile (in minutes) for the time between phone calls.  
A. 3.47                      B. 2.77                      C. 0.72                      D. 0.58
4. Which of the following distributions are skewed right?  
I.  $X \sim \text{Exp}(0.35)$                       II.  $X \sim N(5,2)$                       III.  $X \sim U(0,10)$   
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B. The outcome of each trial is affected by the outcomes of the trials before it.  
C. The probability of success must be the same for all trials.  
D. B and C are both true.

**Questions 6 - 7 refer to the following:**

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B. It is more likely that the length of individual insect is between 1.9 cm and 2.3 cm.  
C. It is more likely that the average length for a sample of 10 insects is between 1.9 cm and 2.3 cm.  
D. Impossible to determine

15. The following represents the probability distribution for the number of Advanced Placement (AP) exams taken by students at City High School.

Let  $X$  = the number of AP exams taken by one student enrolled at City High School.

X	P(X)
0	0.58
1	0.25
2	0.10
3	
4	0.05

Find the expected value for the average number of AP exams taken by students enrolled at this high school.

- A. 0      B. 2.0      C. 0.71      D. 0.53

**Questions 16 - 18 refer to the following:**

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16. Find the probability that it takes one student less than 26 minutes to complete this online quiz.

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17. Find the 60<sup>th</sup> percentile of completion times (in minutes) for the online quiz.

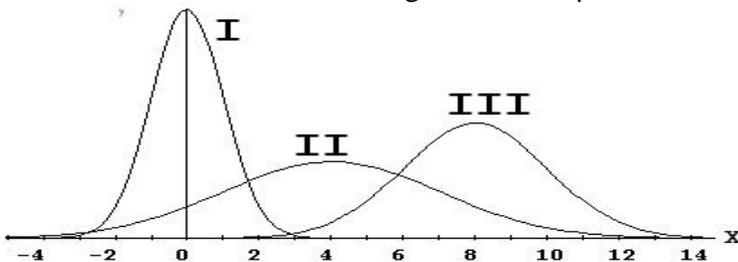
- A. 33.6      B. 29.6      C. 24.4      D. 21.6

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- A.  $N(28, 4.62)$       B.  $U(28, 0.73)$       C.  $U(28, 0.12)$       D.  $N(28, 0.73)$

19. The graph below shows three normal probability distributions.

Which distribution has the largest value of  $\mu$ ? Which distribution has the largest value of  $\sigma$ ?



- A. Largest  $\mu$  : Graph I      ;      Largest  $\sigma$ : Graph II  
B. Largest  $\mu$  : Graph III      ;      Largest  $\sigma$ : Graph II  
C. Largest  $\mu$  : Graph II      ;      Largest  $\sigma$ : Graph III  
D. Largest  $\mu$  : Graph III      ;      Largest  $\sigma$ : Graph I

20. Which of the following is true?

- A. If  $X \sim \text{Exp}(1/10)$ , then  $P(X = 10) = 1/10$   
B. The probability distribution for sample means is the same as the probability distribution for the individuals in the population.  
C. If  $f(x) = 0.10$  on the interval  $[2, 12]$  for a continuous probability distribution, then the distribution is Uniform.  
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	<b>Form A</b>	<b>Form B</b>
<b>1</b>	<b>B</b>	<b>B</b>
<b>2</b>	<b>C</b>	<b>A</b>
<b>3</b>	<b>B</b>	<b>A</b>
<b>4</b>	<b>D</b>	<b>A</b>
<b>5</b>	<b>A</b>	<b>C</b>
<b>6</b>	<b>B</b>	<b>D</b>
<b>7</b>	<b>D</b>	<b>C</b>
<b>8</b>	<b>A</b>	<b>B</b>
<b>9</b>	<b>C</b>	<b>D</b>
<b>10</b>	<b>B</b>	<b>C</b>
<b>11</b>	<b>C</b>	<b>A</b>
<b>12</b>	<b>D</b>	<b>B</b>
<b>13</b>	<b>C</b>	<b>D</b>
<b>14</b>	<b>B</b>	<b>C</b>
<b>15</b>	<b>A</b>	<b>C</b>
<b>16</b>	<b>A</b>	<b>A</b>
<b>17</b>	<b>C</b>	<b>B</b>
<b>18</b>	<b>D</b>	<b>D</b>
<b>19</b>	<b>A</b>	<b>B</b>
<b>20</b>	<b>B</b>	<b>C</b>
<b>21</b>	<b>C</b>	<b>B</b>