1.02 Summarize and analyze univariate data to solve problems.
   a) Apply and compare methods of data collection
   b) Apply statistical principles and methods in sample surveys.
   c) Determine measures of central tendency and spread.
   d) Recognize, define and use the normal distribution curve
   e) Interpret graphical displays of univariate data
   f) Compare distributions of univariate data.

1. A pharmaceutical company is creating a new cholesterol drug to prevent heart disease. The company must collect data by testing the drug before it is approved. Which would be the best method of data collection?
   a. Experimental study   b. Observational study   c. Simulation   d. Survey

2. The table below shows the midterm and final exam grades of ten students.

<table>
<thead>
<tr>
<th>Midterm</th>
<th>68</th>
<th>78</th>
<th>92</th>
<th>90</th>
<th>88</th>
<th>82</th>
<th>94</th>
<th>83</th>
<th>71</th>
<th>62</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>62</td>
<td>77</td>
<td>99</td>
<td>87</td>
<td>85</td>
<td>84</td>
<td>95</td>
<td>98</td>
<td>72</td>
<td>64</td>
</tr>
</tbody>
</table>

Which comparison between the midterm grades and the final exam grades is true?
   a. The final exam grades have a higher mean and standard deviation then the midterm grades.
   b. The final exam grades have a lower mean and standard deviation than the midterm grades.
   c. The final exam grades have a higher mean and a lower standard deviation than the midterm grades.
   d. Then final exam grades have a lower mean and a higher standard deviation than the midterm grades.

3. A baseball team scored the following number of runs in its games this season: 6, 2, 5, 9, 11, 4, 5, 8, 6, 7, 5. There is one more game in the season. If the team wants to end the season with an average of at least 6 runs per game, what is the least number of runs the team must score in the final game of the season?
   a. 2   b. 4   c. 6   d. 8

4. A student wants to determine the most liked professor at her college. Which type of study would be the most practical to obtain this information?

5. A principal wants to survey 150 students to determine which electives to offer during the next school year. There are 1,800 students in the school. Which procedure could the principal use to select a sample using a systematic random sample?
   a. Obtain a list of all students. Start with the eighth student, and select every twelfth student until 150 students have been selected.
   b. Select the first 150 students who enter the school.
   c. Choose the fifth student to come into the cafeteria, and then select every third student who comes into the cafeteria until 150 students have been selected.
   d. Place students’ names on slips of paper and select 150 slips.
6. A reporter wants to know the percentage of voters in the state who support building a new highway. What is the reporter’s population?
   a. The number of people who live in the state
   b. The people who were interviewed in the state
   c. All voters over 25 years old in the state
   d. All eligible voters in the state

7. A town has 685 households. The number of people per household is normally distributed with a mean of 3.67 and a standard deviation of 0.34. Approximately how many households have between 2.99 and 4.01 people?
   a. 493 households  
   b. 520 households  
   c. 558 households  
   d. 575 households

Mary measures the weight of 5 newly hatched pythons in ounces. Here is her data.

<table>
<thead>
<tr>
<th>Python</th>
<th>1 oz</th>
<th>2 oz</th>
<th>3 oz</th>
<th>4 oz</th>
<th>5 oz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary</td>
<td>1.13 oz</td>
<td>1.02 oz</td>
<td>1.23 oz</td>
<td>1.06 oz</td>
<td>1.16 oz</td>
</tr>
</tbody>
</table>

8. Find the mean weight of the pythons
   a. 1.12 ounces  
   b. 0.0827 ounces  
   c. 1.13 ounces  
   d. 1.195 ounces

9. Find the standard deviation of the weight.
   a. 1.12 ounces  
   b. 0.0827 ounces  
   c. 1.13 ounces  
   d. 1.195 ounces

10. Find the median weight
    a. 1.12 ounces  
    b. 0.0827 ounces  
    c. 1.13 ounces  
    d. 1.195 ounces

11. The weights of the male and female students in a class are summarized in the following boxplots:
    Which of the following is NOT true?
    a. About 50% of the male students have weights between 150 and 185 pounds.
    b. About 25% of the female students have weights more than 130 pounds.
    c. The median weight of male students is 162 pounds.
    d. The mean weight of female students is about 120 pounds because of symmetry.

12. Find the standard deviation for: 5, 6, 8, 11, 10
    a. 3.28  
    b. 1.28  
    c. 2.28  
    d. 4.28

13. The heights of American men aged 18 to 24 are approximately normally distributed with mean 68 inches and standard deviation 2.5 inches. 95% of American men’s heights fall between
    a. 65.5 and 70.5 inches
    b. 63 and 73 inches
    c. 60.5 and 75.5 inches
    d. None of these

14. The lifetime of a particular type of car tire is normally distributed. The mean lifetime is 50,000 miles with a standard deviation of 5,000 miles. Of a random sample of 15,000 tires, how many of the tires are expected to last for between 45,000 and 55,000 miles?
    a. 7,125  
    b. 10,200  
    c. 14,250  
    d. 14,850
2.05 Use recursively-defined functions to model and solve problems.
   a) find the sum of a finite sequence
   b) Find the sum of an infinite sequence
   c) Determine whether a given series converges or diverges.
   d) Translate between recursive and explicit representations.

15. A sequence is shown below.
   \[ 1, 0.1, 0.01, 0.001, 0.0001, \ldots \]
   What is the sum of the sequence?
   a. \( \frac{1}{10} \) b. \( \frac{1}{9} \) c. \( \frac{2}{9} \) d. \( \frac{9}{10} \)

16. In the geometric sequence, \( a_1 = 12 \) and \( r = \sqrt{2} \). What is the approximate sum of the first 20 terms of the sequence?
   a. 339.4 b. 8,688.9 c. 29,624.9 d. 29,636.9

17. A bathroom floor has tiles arranged in 9 circles. The innermost circle contains 9 tiles. Each successive circle contains 9 more tiles than the previous circle. How many total tiles are on the bathroom floor?
   a. 81 b. 396 c. 405 d. 729

18. A sequence is shown below.
   \[ 1, 3, 3^3, \ldots \]
   How many terms of the sequence must be added together for the sum to equal 3,280?
   a. 6 b. 7 c. 8 d. 9

19. The first term of an infinite geometric sequence is 2. The sum of the sequence is 6. What is the common ratio of the sequence?
   a. \( \frac{1}{3} \) b. \( \frac{2}{3} \) c. \( \frac{3}{3} \) d. \( \frac{4}{3} \)

20. When \( a_1 = 25,000 \), what is the sum of the infinite sequence defined by the equation \( a_{n+1} = 0.8a_n \)?
   a. 125,000 b. 140,000 c. 160,000 d. 195,000

21. A sequence is shown below.
   \[ 36, -6, 1, -\frac{1}{6}, 1/36, \ldots \]
   What is the sum of the sequence?
   a. -36/5 b. 36/7 c. 216/7 d. 216/5

22. Determine whether the sequence is arithmetic or geometric. If possible, find the common difference of the common ratio:
   \[ \frac{1}{2}, \frac{3}{4}, \frac{9}{8}, \frac{27}{16}, \frac{81}{32}, \ldots \]
   a. Arithmetic, \( d = 0.25 \) b. Arithmetic, \( r = 1.5 \) c. geometric, \( d = 0.25 \) d. geometric, \( r = 1.5 \)

23. Determine whether the sequence is arithmetic or geometric. If possible, find the common difference or the common ratio:
   \[ \frac{4}{5}, \frac{7}{5}, \frac{13}{5}, \frac{16}{5}, \ldots \]
   a. arithmetic, \( d = 3/5 \) b. arithmetic, \( r = 7/4 \) c. geometric \( d = 3/5 \) d. geometric \( r = 7/4 \)

24. Find the sum of the geometric series: \( 15, -\frac{5}{3}, -\frac{5}{9}, \ldots \)
   a. \( \frac{1322}{108} \) b. \( \frac{3644}{324} \) c. \( \frac{5}{4} \) d. \( \frac{1214}{108} \)