Applications

> *A bargain ain't a bargain unless it's something you need.*
> —Sidney Carroll, film and television screenwriter

1. Interpret the quote in terms of what you have learned about essential and discretionary expenses. See margin.

2. For most people, health club membership expenses are considered discretionary. Alli lives in a big city and wants to join a health club. She researched monthly membership costs and found the following for health clubs within a 5-mile radius of her apartment.

   $65, $50, $44, $86, $90, $50, $35, $110, $70, $50, $35, $60, $56

   a. What is the mean monthly membership fee? Round your answer to the nearest cent. $61.62
   b. What is the median monthly membership fee? $56
   c. What is the mode monthly membership fee? $50

3. Kate is a professional musician. She wants to make an essential purchase of an upgraded used bass guitar for her work. She found the following prices for the same make and model bass guitar from various sellers:

   $699, $599, $699, $680, $590, $720, $650, $800

   a. What is the mean price? Round your answer to the nearest cent. $679.63
   b. What is the median price? $689.50
   c. What is the mode price? $699

4. Nick and Liz have decided to move from the city to the suburbs. This means that they will have to make the essential purchase of a car in order to get to work. They researched used 2-year-old cars of the same make, model, condition, and equipped with the same options. They found a website stating that the average price should be $18,500. These are the prices they were quoted:

   $15,500 $18,800 $16,900 $19,900 $18,000 $21,000

   If they continued their search for one more price quote, what would that price have to be so that the mean of all seven of the car prices would be the same as the mean quoted on the website? $19,400

5. Before the last school year began, it was estimated that the average discretionary personal expenses each school year for a student attending a 4-year public college were $2,110. This past summer Ashley decided to poll seven of her friends attending a 4-year public college because she thought that estimate was low. She made a list of their actual school-year expenses:

   $2,800 $1,990 $2,005 $2,400 $1,860 $2,200 $2,000

   a. What is the mean of her friends' personal expenses? Round your answer to the nearest cent. $2,179.29
   b. How does that average compare with the estimate? about $70 higher
   c. What would Ashley's actual personal expenses for that school year have to be so that her amount and her friends' amounts together would have an average of $2,110? $1,625.00

Use the following table to answer questions 6–9.

Monthly Water Bills

Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
x_1	x_2	x_3	x_4	x_5	x_6	x_7	x_8	x_9	x_{10}	x_{11}	x_{12}
\$40	\$42	\$40	\$38	\$48	\$50	\$58	\$62	\$56	\$46	\$44	\$44

6. Write the formula for the mean water bill for the entire year using sigma notation and determine that mean. Round your answer to the nearest cent. See margin.

7. Write the formula for the mean water bill for the first 6 months of the year using sigma notation and determine that mean. Round your answer to the nearest cent. See margin.

8. Write the formula for the mean water bill from April through November using sigma notation and determine that mean. Round your answer to the nearest cent. See margin.

9. Write the sigma notation mean formula for the consecutive 3-month period that would have the highest mean of the year. See margin.

Use the following table to answer questions 10–12.

Elizabeth wants to change cell phone plans. Before contacting the service provider, she makes a table of her cell phone minutes used over the course of a week.

Daily Cell Phone Minutes Used

Mon	Tues	Wed	Thurs	Fri	Sat	Sun
x_1	x_2	x_3	x_4	x_5	x_6	x_7
38	62	40	10	30	55	65

10. Round the following value $\dfrac{1}{7}\sum\limits_{i=1}^{7} x_i$ to the nearest minute.

Interpret the answer in the context of the problem. See margin.

11. Round the following value $\dfrac{1}{4}\sum\limits_{i=2}^{5} x_i$ to the nearest minute.

Interpret the answer in the context of the problem. See margin.

12. Write the sigma notation mean formula for the 4 consecutive days that would have the lowest mean of the week. See margin.

13. Airline flights can be either discretionary or essential. For most people, the price you pay for where you sit in the plane is a discretionary expense. The seat map for a particular flight is shown here.
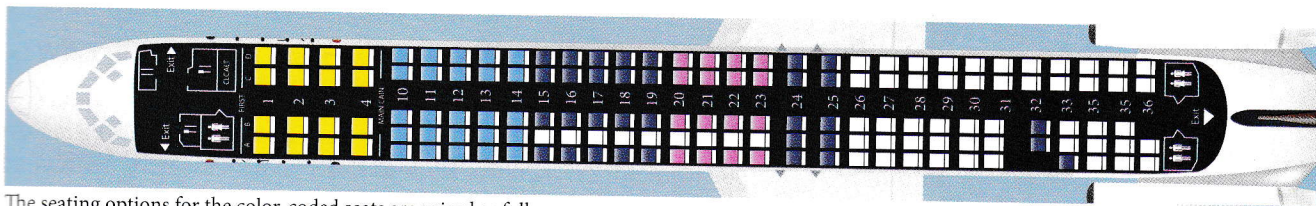
The seating options for the color-coded seats are priced as follows:

☐ First Class: $850 ☐ Deluxe Premium: $540 ☐ Preferred Plus: $400 ☐ Preferred: $320 ☐ Economy: $280

There are a total of 149 seats on this flight. Although seating prices change based on a number of factors, answer the questions below based on the prices listed above.

a. Construct a frequency distribution with column headings "Seat Type," "Price," and "Number of Seats." See margin.
b. If all seats were sold for this flight, what would be the total airline income for the seats? $61,940
c. Determine the mean, median, and mode for seat prices. Round to the nearest cent. Mean: $415.70; Median: $320; Mode: $280

13a.

Seat Type	Price	Number of Seats
First Class	$850	16
Deluxe Premium	$540	25
Preferred Plus	$400	33
Preferred	$320	16
Economy	$280	59

14. There are many cell phone case options on the market. This discretionary item comes in a variety of colors, materials, thicknesses, protection levels, and more. Amit runs a small business that sells computer and phone accessories. He has kept the following inventory of cell phone case sales for similar model phones:

$19.99, $8.99, $35.99, $49.99, $49.99, $39.99, $99.99, $79.99, $35.99,

$19.99, $49.99, $29.99, $49.99, $54.99, $35.99, $49.99, $19.99, $8.99,

$29.99, $35.99

a. Write the formula for the mean in sigma notation and use it to calculate the mean cell phone case price. Round your answer to the nearest cent. See margin.
b. Construct a frequency distribution for the data. See margin.
c. Use the frequency distribution to determine the mean. $40.34
d. Use the frequency distribution to determine the median and the mode. Median: $35.99; Mode: $49.99

14a. $\bar{x} = \dfrac{1}{20} \sum_{i=1}^{20} x_i = \$40.34$

14b.

Price	Frequency
8.99	2
19.99	3
29.99	2
35.99	4
39.99	1
49.99	5
54.99	1
79.99	1
99.99	1

15. Medications are essential expenses. DeWitt has composed a price list of antibiotics available at different pharmacies in his neighborhood. In reviewing his list, he can't find the number of pharmacies selling the antibiotics for $8. Examine the frequency distribution for the prices. Write an expression for the mean.

$\dfrac{4.10(3) + 4.85(2) + 8x + 12 + 12.5(2)}{3 + 2 + x + 1 + 2} = \dfrac{59 + 8x}{8 + x}$

Price	Frequency
$4.10	3
$4.85	2
$8.00	x
$12.00	1
$12.50	2