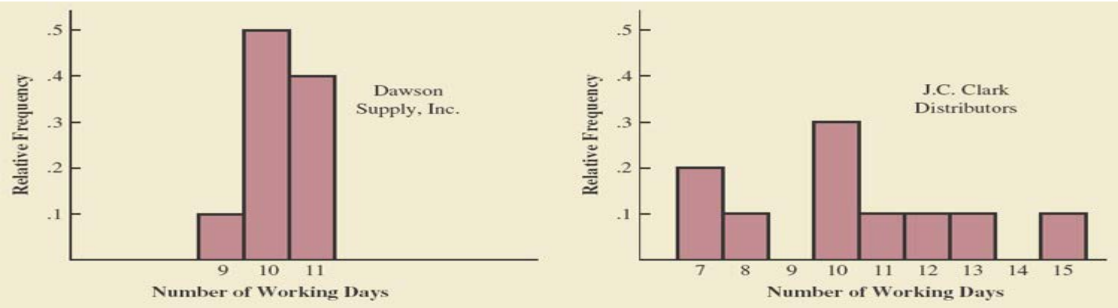
Chapter 3 Problems and Solutions - Descriptive Statistics: Numerical Measures

2. Consider a sample with data values of 10, 20, 21, 17, 16, and 12. Compute the mean and median.

30 (20 in Chapter 6). The following data were used to construct the histograms of the number of days required to fill orders for Dawson Supply, Inc., and J.C. Clark Distributors (see Figure 3.5).

Dawson Supply Days for Delivery:	11	10	9	10	11	11	10	11	10	10
Clark Distributors Days for Delivery:	8	10	13	7	10	11	10	7	15	12

Use the range and standard deviation to support the previous observation that Dawson Supply provides the more consistent and reliable delivery times.



34. (24 in Chapter 6. The following times were recorded by the quarter-mile and mile runners of a university
track team (times are in minutes).

Quarter-Mile Times:	.92	.98	1.04	.90	.99
Mile Times:	4.52	4.35	4.60	4.70	4.50

After viewing this sample of running times, one of the coaches commented that the quarter- milers turned in the more consistent times. Use the standard deviation and the coefficient of variation to summarize the variability in the data. Does the use of the coefficient of variation indicate that the coach's statement should be qualified?

40. (30 in Chapter 6). The Energy Information Administration reported that the mean retail price per gallon of
regular grade gasoline was \$3.43 (Energy Information Administration, July 2012). Suppose that the standard deviation was \$.10 and that the retail price per gallon has a bell- shaped distribution.

a. What percentage of regular grade gasoline sold between \$3.33 and \$3.53 per gallon?
b. What percentage of regular grade gasoline sold between \$3.33 and \$3.63 per gallon?
c. What percentage of regular grade gasoline sold for more than \$3.63 per gallon?

58 (48 in Chapter 6). A department of transportation's study on driving speed and miles per gallon for midsize
automobiles resulted in the following data:

Speed (Miles per Hour)	30	50	40	55	30	25	60	25	50	55
Miles per Gallon	28	25	25	23	30	32	21	35	26	25

Compute and interpret the sample correlation coefficient.

Chapter 3 Solutions

2. $$\bar{x} = \frac{\Sigma x_i}{n} = \frac{96}{6} = 16$$

10, 12, 16, 17, 20, 21

Median = $\frac{16+17}{2} = 16.5$

30 (20). Dawson Supply: Range = 11 - 9 = 2

$$s = \sqrt{\frac{4.1}{9}} = 0.67$$

J.C. Clark: Range = 15 - 7 = 8

$$s = \sqrt{\frac{60.1}{9}} = 2.58$$

34 (24). Quarter milers

$s = 0.0564$

Coefficient of Variation = $(s/\bar{x})$100% = (0.0564/0.966)100% = 5.8%

Milers

$s = 0.1295$

Coefficient of Variation = $(s/\bar{x})$100% = (0.1295/4.534)100% = 2.9%

Yes; the coefficient of variation shows that as a percentage of the mean the quarter milers' times show more variability.

40 (30). a. $3.33 is one standard deviation below the mean and $3.53 is one standard deviation above the mean. The empirical rule says that approximately 68% of gasoline sales are in this price range.

b. Part (a) shows that approximately 68% of the gasoline sales are between $3.33 and $3.53. Since the bell-shaped distribution is symmetric, approximately half of 68%, or 34%, of the gasoline sales should be between $3.33 and the mean price of $3.43. $3.63 is two standard deviations above the mean price of $3.43. The empirical rule says that approximately 95% of the gasoline sales should be within two standard deviations of the mean. Thus, approximately half of 95%, or 47.5%, of the gasoline sales should be between the mean price of $3.43 and $3.63. The percentage of gasoline sales between $3.33 and $3.63 should be approximately 34% + 47.5% = 81.5%.

c. $3.63 is two standard deviations above the mean and the empirical rule says that approximately 95% of the gasoline sales should be within two standard deviations of the mean. Thus, 1 – 95% = 5% of the gasoline sales should be more than two standard deviations from the mean. Since the bell-shaped distribution is symmetric, we expected half of 5%, or 2.5%, would be more than $3.63.

58 (48). Let x = miles per hour and y = miles per gallon

$$\Sigma x_i = 420 \quad \bar{x} = \frac{420}{10} = 42 \quad \Sigma y_i = 270 \quad \bar{y} = \frac{270}{10} = 27$$

$$\Sigma(x_i - \bar{x})(y_i - \bar{y}) = -475 \quad \Sigma(x_i - \bar{x})^2 = 1660 \quad \Sigma(y_i - \bar{y})^2 = 164$$

$$s_{xy} = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{n-1} = \frac{-475}{10-1} = -52.7778$$

$$s_x = \sqrt{\frac{\Sigma(x_i - \bar{x})^2}{n-1}} = \sqrt{\frac{1660}{10-1}} = 13.5810$$

$$s_y = \sqrt{\frac{\Sigma(y_i - \bar{y})^2}{n-1}} = \sqrt{\frac{164}{10-1}} = 4.2687$$

$$r_{xy} = \frac{s_{xy}}{s_x s_y} = \frac{-52.7778}{(13.5810)(4.2687)} = -.91$$

A strong negative linear relationship exists. For driving speeds between 25 and 60 miles per hour, higher speeds are associated with lower miles per gallon.