

A marketing consultant observed 14 shoppers at random at a grocery store. The amount each shopper spent, rounded to the nearest dollar, is arranged in increasing order below:

1, 9, 13, 14, 17, 22, 28, 35, 36, 44, 51, 59, 70, 110

- a. Complete the table with the requested six-number summary for these data.  
(6 points)

Min	Q1	Median	Mean	Q3	Max
1	14	31.5	36.4	51	110

$$\bar{x} = \frac{509}{14} = 36.4$$

- b. For the given sample,  $SS_{xx} = \sum_{i=1}^{14} (x_i - \bar{x})^2 = 11037.21$ . Use this value to compute the sample standard deviation. (3 points)

$$s = \sqrt{s^2} = \sqrt{\frac{11037.21}{14-1}} = \sqrt{849.02} = 29.1$$

- c. Based on the information in the sample, how much money would you expect a randomly selected shopper to have spent if that shopper's spending is 1 standard deviation above the mean? Round your answer to the nearest dollar. (4 points)

$$1 = \frac{x_0 - \bar{x}}{s} \Rightarrow x_0 = s + \bar{x} = 29.1 + 36.4 = 65.5$$

Rounded to the nearest dollar, a randomly selected shopper who spends 1 SD above the mean will have spent about \$66.

- d. Assume that the distribution of money spent is mound-shaped (unimodal) and approximately symmetric. Using the empirical rule, about what percentage of shoppers would you expect to spend more than the value you calculated in part c)? (3 points)

Based on the empirical rule, approximately 68% of the values should fall within +/- 1SD of the mean. Thus, the percentage exceeding 1SD above the mean will be about  $(100\% - 68\%)/2 = 16\%$ .

- e. Using the 1.5 x IQR criteria, identify any points that you would flag as suspected outliers.  
(4 points)

$$IQR = Q3 - Q1 = 51 - 14 = 37$$

$$1.5 \times IQR = 1.5 \times 37 = 55.5$$

$$Q3 + 55.5 = 51 + 55.5 = 106.5$$

The data value of \$110 should be flagged.