Topic 1: Introduction to Statistics Solutions

Q7

a) Population Mean, $\mu = 6$

b) Population Variance, $\sigma^2 = 10.2$

Population Standard Deviation, $\sigma = 3.1937$

Q8

$$\text{Mean, } \bar{X} = \frac{23.5+19.8+21.3+22.6+19.4+18.2+24.7+21.9+20.0+21.1}{10} = 21.25$$

$$\text{Standard Deviation, S} = \sqrt{\frac{(23.5-21.25)^2+\ldots+(21.1-21.25)^2}{10-1}} = 1.9896$$

Q9

a) Mean, $\overline{X} = 36.53$

Median = 35.6

b) Variance, $S^2 = 19.27$

Standard Deviation, S = 4.39

Range = 43 – 31 = 12

c) Since the mean is only slightly greater than the median, the data are slightly right-skewed

d) There is a $12 difference between the most expensive and the least expensive outlet. The prices vary around $36.53 with half of the outlets being more expensive than $35.6. The middle half of the prices fall between $33.75 and $40.25.

Q10

a) $Q_1 = 5.25$ th obs ~5 th obs = 16

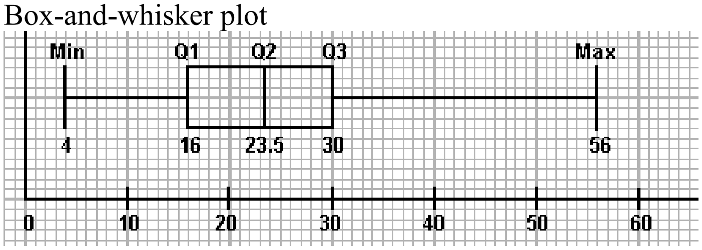
$Q_3 = 15.75$ th obs ~16 th obs = 30

Interquartile range = $Q_3 - Q_1 = 30 - 16 = 14$

b) Minimum = 4 1[st] Quartile = 16 Median = 23.5

3[rd] Quartile = 30 Maximum = 56

c) Box-and-whisker plot



The amount of fat is right-skewed.

Q11

a) sample mean, $\bar{X}$ = (19+19+20+20+20+ 22+ 23+ 25+ 26+ 27+ 30) /10 = 22.8182

sample standard deviation, S = 3.7099

b) Min. value = 19
Q1 = value of ((11+1)/4)-th obs = 3rd obs = 20
Q2 = value of (2*(11+1)/4)-th obs = 6th obs = 22
Q3 = value of (3*(11+1)/4)-th obs = 9th obs = 26
Max. value = 30

Five-number summary: 19, 20, 22, 26, 30
Since (Q3-Q2) > (Q2-Q1), the distribution is right-skewed.

Q12

a) Bank branch in commercial district:

Mean, $\bar{x} = \frac{\sum X}{n}$ = 4.287 mins

Median, $Q_2 = \frac{n+1}{2}$ th obs. = $\frac{15+1}{2}$ th obs =8 th obs = 4.5 mins

$\because Q_1 = \frac{n+1}{4}$ th obs= 4th obs = 3.2 mins $\quad Q_3 = \frac{3(n+1)}{4}$ =12 th obs = 5.55 mins

$\therefore$ interquartile range = Q_3-Q_1= 5.55-3.20=2.35 mins

Bank branch in residential area:

Mean, $\bar{x} = \frac{\sum X}{n}$ = 7.115 mins

Median, $Q_2 = \frac{n+1}{2}$ th obs.= $\frac{15+1}{2}$ th obs =8 th obs = 6.68 mins

$\because Q_1 = \frac{n+1}{4}$ th obs= 4th obs = 5.64 mins $\quad Q_3 = \frac{3(n+1)}{4}$ =12 th obs = 8.73 mins

$\therefore$ interquartile range = Q_3-Q_1= 8.73-5.64=3.09 mins

b) Commercial: min=0.38, Q_1=3.20, Q_2 =4.50, Q_3=5.55, max=6.46, left-skewed

Residential: min=3.82, Q_1=5.64, Q_2 =6.68, Q_3=8.73, max=10.49, right-skewed

c) The central tendency of the waiting time for the bank branch located in the commercial district is lower than that of the branch located in residential area. Also, the normal waiting time for residential area is longer than that of commercial area.