1. Calculatem mean, median, mode, variance, standard deviation skewness, kurtosis on data set $3, 7, 7, 19, 24, 24, 25, 38, 30$.

A. mean: $\bar{a} = \frac{1}{n}\sum_{i=1}^{n} x_i$

$$\Rightarrow \frac{3+7+7+19+24+24+25+38+30}{10} = 19.1$$

median: 24

mode: 24

variance: $\sigma^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2$

$\Rightarrow (3-19.1)^2 + (7-19.1)^2 + (7-19.1)^2 + (19-19.1)^2 + (24-19.1)^2 + (24-19.1)^2 +$

$+ (25-19.1)^2 + (38-19.1)^2 + (30-19.1)^2$

$\Rightarrow (16.1)^2 + (-12.1)^2 + (-12.1)^2 + (-0.1)^2 + (4.9)^2 + (5.9)^2 + (8.9)^2 + (10.9)^2$

$\Rightarrow \sigma^2 = \dfrac{260.01 + 146.41 + 146.41 + 0.01 + 24.01 + 24.01 + 24.01 + 24.01 + 34.81}{10}$

$\Rightarrow \sigma^2 = \dfrac{828.7}{10} = 82.87$

standard deviation $= \sigma = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i-\bar{x})^2}$

$$\sigma = \sqrt{82.81}$$

$$\sigma \approx 9.78$$

Skewness $= \dfrac{h}{(n-1)(n-2)}\sum_{i=1}^{n}\left(\dfrac{x_i - \bar{x}}{3}\right)^3$

$\left(\dfrac{x_i - \bar{x}}{3}\right)^3$

$\left(\dfrac{3-19.1}{9.10}\right)^3 = \left(\dfrac{-16.1}{9.78}\right)^3 = 4.46$

$\left(\dfrac{7-19.1}{9.10}\right)^3 = \left(\dfrac{-12.1}{9.78}\right)^3 = -1.85$

$\left(\dfrac{7-19.1}{9.10}\right)^3 = \left(\dfrac{-12.1}{9.78}\right)^3 = -1.85$

$\left(\dfrac{19-19.1}{9.10}\right)^3 = \left(\dfrac{-0.1}{9.78}\right)^3 = -0.00$

$\left(\dfrac{24-19.1}{9.10}\right)^3 = \left(\dfrac{4.9}{9.78}\right)^3 = 0.138$

$\left(\dfrac{24-19.1}{9.10}\right)^2 = \left(\dfrac{4.9}{9.78}\right)^3 = 0.136$

$\left(\dfrac{25-19.1}{9.10}\right)^3 = \left(\dfrac{7.9}{9.78}\right)^3 = 0.27$

$\left(\dfrac{38-19.1}{9.10}\right)^3 = \left(\dfrac{18.9}{9.78}\right)^3 = 0.75$

$\left(\dfrac{30-19.1}{9.10}\right)^3 = \left(\dfrac{10.9}{9.78}\right)^3 = 1.39$

Sum $= 5.59$

$\dfrac{10}{(10-1)(10-2)} \times (0.59)$

$\dfrac{10}{9 \times 8} \times (-7.79)$

$$= \frac{10}{72} \times (-5.59)$$

$$= -0.776.$$

kurtosis: $\frac{n(n+1)}{(n-1)(n-2)(n-3)} \sum_{i=1}^{n} \left(\frac{x_i \cdot x}{3}\right)^4 - \frac{3(n-1)^3}{(n-2)(n-3)}$

$$\left(\frac{-16.1}{9.78}\right)^4 = 7.33 \qquad \left(\frac{4.9}{9.78}\right)^4 = 0.06 \qquad \left(\frac{8.9}{9.78}\right)^4 = 0.69$$

$$\left(\frac{-12.1}{9.78}\right)^4 = 2.33 \qquad \left(\frac{4.9}{9.78}\right)^4 = 0.06 \qquad \left(\frac{10.9}{9.78}\right)^4 = 1.5$$

$$\left(\frac{-12.1}{9.78}\right)^4 = 2.35 \qquad \left(\frac{4.9}{9.78}\right)^4 = 0.06$$

$$\left(\frac{-0.1}{9.78}\right)^4 = 0.00 \qquad \left(\frac{5.9}{9.78}\right)^4 = 0.13$$

sum $= 14.48.$

$$\Rightarrow) \quad \frac{10(11)}{9 \times 8 \times 7} + 14.48 - \frac{3(9)^2}{8 \times 7}.$$

$$= \frac{110}{504} \times 14.48 - \frac{243}{56}.$$

$$= 3.16 - 4.34$$

$$= -1.18.$$