Review Questions 11

1. For the sample data, determine the following

a) median, mode, mean
b) range, standard deviation, variance
c) number of classes, frequency table and a histogram plot
d) the skewness of the distribution
e) z-score and determine if there are any outliers for the data set
f) What percentage of the data falls within ±2s from the mean?

83, 64, 75, 72, 78, 83, 57, 93, 51, 68, 89

2. For the sample data, determine the following

a) median, mode, mean
b) range, standard deviation, variance
c) number of classes , frequency table and a histogram plot
d) the skewness of the distribution
e) z-score and determine if there are any outliers for the data set
f) What percentage of the data falls within ±3s from the mean?

2.01, 2.00, 1.89, 1.93, 1.93, 2.02, 2.08, 2.24, 1.82, 1.76, 2.17, 2.11, 1.84, 2.34

3. The quality control department sampled 25 network cables of 100 cm in length. The manufacturer provided the following information about the length of the network cables, $\bar{x}$ = 94 cm and the s = 2.8 cm.

a) If the shape of the distribution is not normal, what percentage of the cables have lengths between 86 cm and 102 cm? [Hint: find k first]

b) If we assume that the distribution of cable lengths is symmetrical and bell-shaped (normal), then 68% of the cables will have lengths between what 2 values?

Answers:

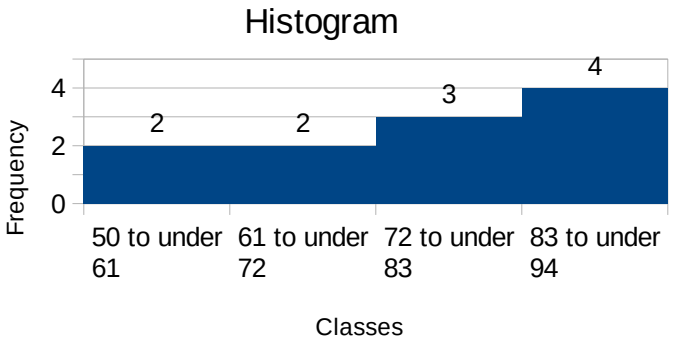
1. average (mean) = 73.909
median = 75
mode = 83
standard deviation = 13.13
variance = 172.29
range = 42
no outliers since z-scores values are not smaller than -3 or greater than +3
sk = -0.32
The distribution of data is left skewed

n = 11
2^j => n... j = 4
i > (max-min)/j = 42/4 = 10.5...I will use 11 for the interval

since the data is left skewed...the distribution is not symmetrical and therefore we cannot use the Empirical rule to determine the % distribution...instead we use Chebyshev's theorem...$1 - 1/k^2$

$1 – 1/2^2 = 1 – ¼ = 1- 0.25 = 0.75$….75% of the data is within ±2s of the mean

Classes (bins)	Frequency Count
50 to under 61	2
61 to under 72	2
72 to under 83	3
83 to under 94	4



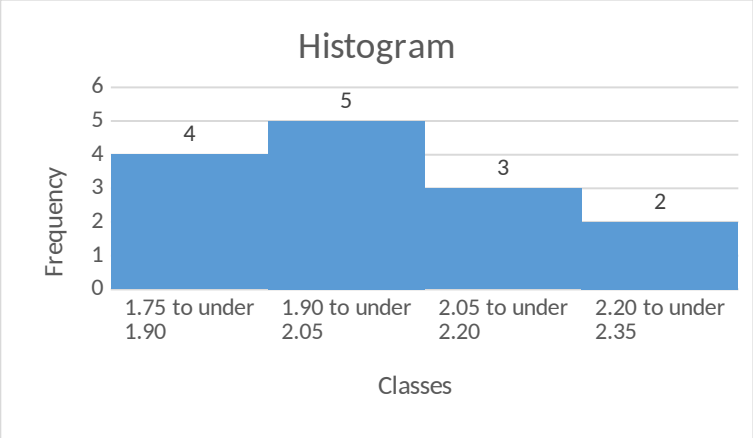
2. average (mean) = 2.01
median = 2.005
mode = 1.93
standard deviation = 0.165
variance = 0.0274
range = 0.58
no outliers since z-scores values are not smaller than -3 or greater than +3
sk = +0.46
The distribution of data is right skewed

n = 14
2^j => n... j = 4
i > (max-min)/j = 0.58/4 = 0.145...I will use 0.15 for the interval

since the data is right skewed...the distribution is not symmetrical and therefore we cannot use the Empirical rule to determine the % distribution...instead we use Chebyshev's theorem...$1 - 1/k^2$

$1 – 1/3^2 = 1 – 1/9 = 1- 0.111 = 0.889$….88.9% of the data is within ±3s of the mean

Classes (bins)	Frequency Count
1.75 to under 1.90	4
1.90 to under 2.05	5
2.05 to under 2.20	3
2.20 to under 2.35	2



3.

a) since the mean = 94 cm and s = 2.8 cm
the difference between the range with respect to the mean is then 86 – 94 – 102, Δ = 8...
hence we can use the formula to find the k value, Δ = ks.....8 = k(2.8).....k = 2.857
then we use the Chebyshev's theorem and formula $1 – 1/k^2 = 1 – 1/(2.857)^2 = 0.877$....
meaning that 87% of the observations fall within that range of 86 to 102 cm

b) if assume a symmetrical bell shaped distribution (normal distribution), then from the table 68% represents ±1s which translates as a range of ±1(2.8) = ±2.8.....94 + 2.8 = 96.8 cm
94 – 2.8 = 91.2 cm