The data is obtained from exercise 85 from chapter 3.

The manager of local Wal-Mart super store is studying the number of items purchased by customers in the evening hours. Listed below is the number of items for a sample of 30 customers.

15	8	6	9	9	4	18	10	10	12
12	4	7	8	12	10	10	11	9	13
5	6	11	14	5	6	6	5	13	5

Construct a frequency distribution.

Range = 18 -4 = 14

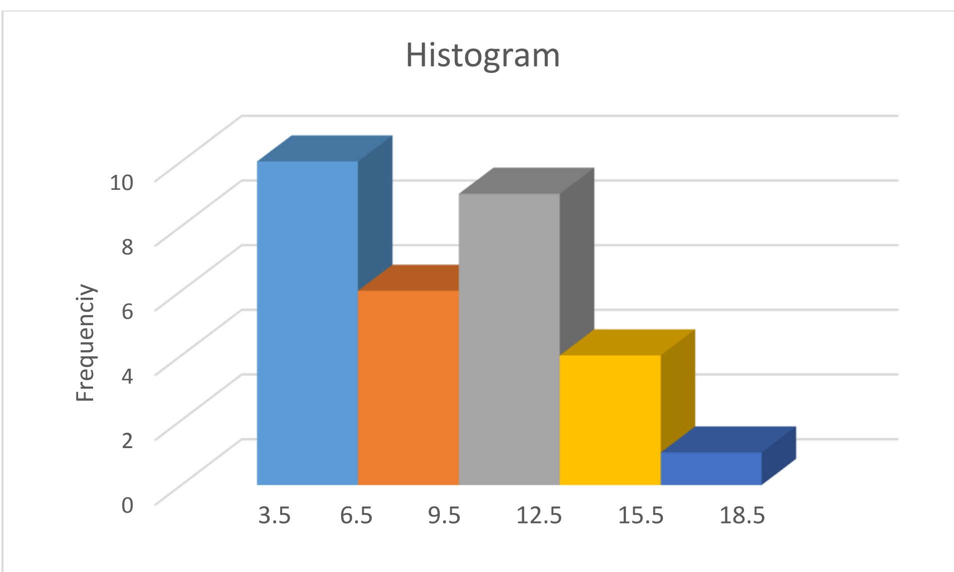
$2^K > n \rightarrow 2^5 > 30 \rightarrow K = 5$

$i \geq \frac{14}{5} = 2.8 \rightarrow 3$

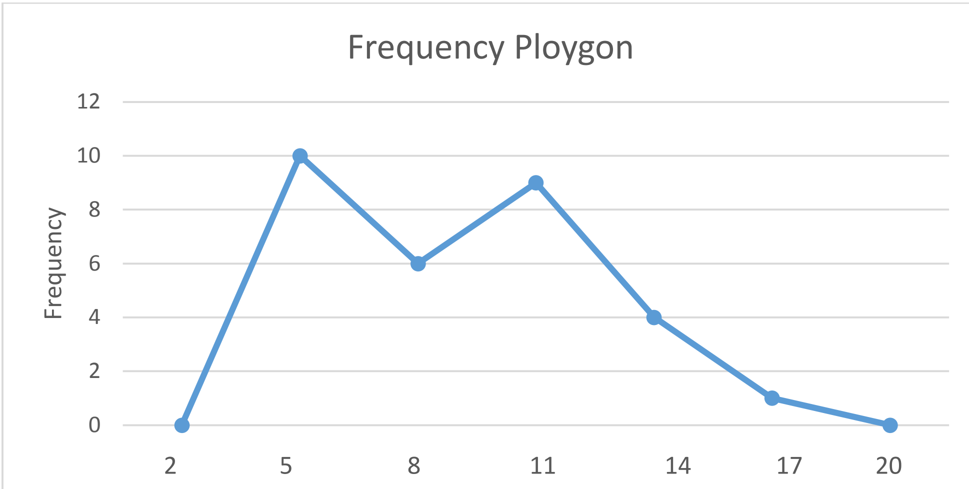
The new rage is 3*5 = 15

Class	Frequency
3.5 – 6.5	10
6.5 – 9.5	6
9.5 – 12.5	9
12.5 – 15.5	4
15.5 – 18.5	1

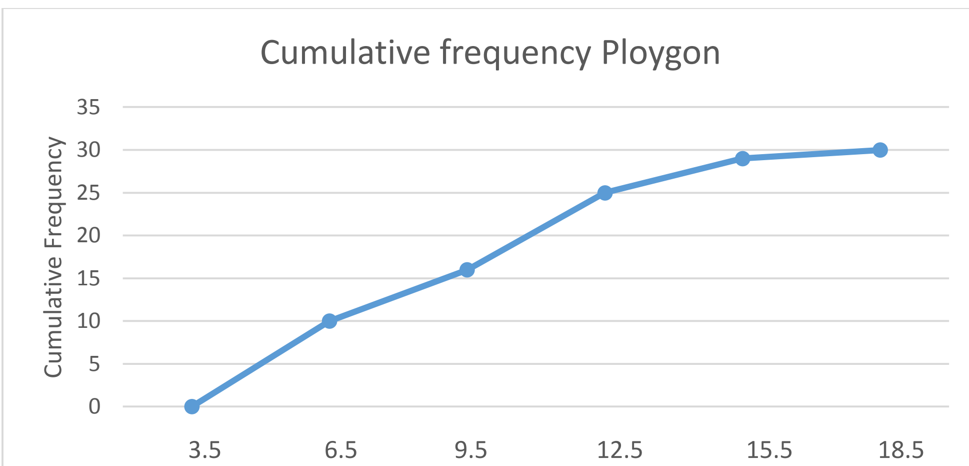
Histogram:



Frequency polygon:



Cumulative Frequency polygon:



Consider it as raw data:

Mean $(\bar{X})$ = $\frac{\sum X}{n}$ = $\frac{273}{30}$ = 9.1

4	4	5	5	5	5	6	6	6	6	7	8
	8	9	9	9	10	10	10	10	11	11	12
	12	12	13	13	14	15	18				

Median (Q_2) = 30/2 = 15, 30/2 +1 = 16 or Second Quarter (Q_2) = (31) * $\frac{50}{100}$ = 15.5 → 9 + 0.5 (9-9) = 9

So the median = $\frac{9+9}{2}$ = 9

First Quarter (Q_1) = (31) * $\frac{25}{100}$ = 7.75 → 6 + 0.75 (0) = 6

Third Quarter (Q_3) = (31) * $\frac{75}{100}$ = 23.25 → 12 + 0.25 (0) = 12

Draw a boxplot:

Compute sample mean, sample mean deviation and sample variance and sample standard deviation.

X	X - Xbar	|X - Xbar|	(X - Xbar)^2
15	5.9	5.9	34.81
8	-1.1	1.1	1.21
6	-3.1	3.1	9.61
9	-0.1	0.1	0.01
9	-0.1	0.1	0.01
4	-5.1	5.1	26.01
18	8.9	8.9	79.21
10	0.9	0.9	0.81
10	0.9	0.9	0.81
12	2.9	2.9	8.41
12	2.9	2.9	8.41
4	-5.1	5.1	26.01
7	-2.1	2.1	4.41
8	-1.1	1.1	1.21
12	2.9	2.9	8.41
10	0.9	0.9	0.81
10	0.9	0.9	0.81
11	1.9	1.9	3.61
9	-0.1	0.1	0.01
13	3.9	3.9	15.21
5	-4.1	4.1	16.81
6	-3.1	3.1	9.61
11	1.9	1.9	3.61
14	4.9	4.9	24.01
5	-4.1	4.1	16.81
6	-3.1	3.1	9.61
6	-3.1	3.1	9.61
5	-4.1	4.1	16.81
13	3.9	3.9	15.21
5	-4.1	4.1	16.81
		87.2	368.7
Sample mean	9.1		
mean Deviation		2.9066667	
Variance		12.713793	
Standard Deviation		3.5656406	

Class	Frequency	M	FM	M - $\bar{X}$	(M - $\bar{X}$)^2	F(M - $\bar{X}$)^2
3.5 – 6.5	10	5	50	-4	16	160
6.5 – 9.5	6	8	48	-1	1	6
9.5 – 12.5	9	11	99	2	4	36
12.5 – 15.5	4	14	56	5	25	100
15.5 – 18.5	1	17	17	8	64	64
Total			270			366

Sample mean = $\frac{270}{30}$ = 9

Sample Variance = $\frac{366}{29}$ = 12.62

Sample Standard Deviation = $\sqrt{\frac{366}{29}}$ = 3.55

29/ listed below is the percent increase in sales for MG Corporation over the last 5 years. Determine the geometric mean percent increase in sales over the period.

9.4 13.8 11.7 11.9 14.7

GM = $\sqrt[5]{(1.094)(1.138)(1.117)(1.119)(1.147)}$ = 1.1228 → 12.28%

31/ The Consumer Price index is reported monthly by the U.S. Bureau of Labor Statistics. It reports the change in prices for market basket of goods from one period to another. The index for 1994 was 148.2, by 2007 it increased to 210.2. What was the geometric mean annual increase for the period?

GM = $\sqrt[13]{\frac{210.2}{148.2}}$ -1 = 0.0272

53/ According to Chebyshev's theorem, at least what percent of any set of observations will be within 1.8 standard deviations of the mean?

K = 1.8 → 1- $\frac{1}{K^2}$ → 1- $\frac{1}{1.8^2}$ = 1- $\frac{1}{3.24}$ = 0.6913 → 69.13%

54/ The mean income of a group of a sample observations is $500; the standard deviation is 40$. According to Chebyshev's theorem, at least what percent of incomes will lie between $400 and $600?

$\bar{X}$ = $500, S = $40

(400, 600) 600 – 500 = 100→ 100/40 = 2.5 K = 2.5

1- $\frac{1}{K^2}$ → 1- $\frac{1}{2.5^2}$ = 1- $\frac{1}{6.25}$ = 0.84 → 84%

55/ The distribution of weights of a sample of 1400 cargo containers is symmetric and bell-shaped. According to Empirical Rule, what percent of weights will lie?

a/ Between $\bar{X}$ -2S and $\bar{X}$ +2S

95%

b/ Between $\bar{X}$ and $\bar{X}$ + 2S?

0.4750

Below $\bar{X}$ -2S?

0.0250