Program

```
x <- c(15,45,40,42,50,62,60,70,42,75, 75, 80, 81, 25, 26,
       31,32,78,45,31,45,42,43, 55,56, 78 ); x

m <- mean(x); m
logx <- log (x,10); logx
loggm <- sum(logx)/length(x); loggm
gm <- 10^(loggm); gm
y <- 1/x; y
hm <- length(x)/sum(y); hm
```

output

```
mean = 51.55556
harmonic mean = 43.39266
geometric mean = 47.71364
```

PRACTICAL SHEET - 02

Measures of central tendency

1. Calculate the Arithmetic mean, geometric mean and harmonic mean.

15, 45, 40, 42, 50, 60, 62, 68, 70, 42, 75, 75, 80, 81, 25, 26, 31, 32
78, 45, 31, 45, 31, 45, 42, 43, 55, 56, 78

Procedure

$n = 27$.

Mean $= \Sigma x / n = 1392/27 \approx 51.56$

x	logx	1/x
15	1.1761	0.0667
45	1.6532	0.0222
40	1.6021	0.02
42	1.6232	0.0238
50	1.6990	0.02
60	1.7782	0.0167
62	1.7924	0.0161
68	1.8325	0.0147
70	1.8451	0.0143
42	1.6232	0.0238
75	1.8751	0.0133
75	1.8751	0.0133
80	1.9031	0.0125
81	1.9085	0.0123
25	1.3979	0.04

x	logx	1/x
26	1.4150	0.0384
31	1.4914	0.0322
32	1.5051	0.0313
78	1.8921	0.0128
45	1.6532	0.0222
31	1.6232	0.0322
45	1.6532	0.0222
42	1.6232	0.0238
43	1.6335	0.0233
55	1.7404	0.0182
56	1.7482	0.0179
78	1.8921	0.0128

Geometric mean, GM = $\text{antilog}\left(\frac{\Sigma \log x}{n}\right)$

= 47.71

Harmonic mean = $\frac{n}{\Sigma 1/x}$

= 43.393

program

```
x<-c(45,50,55,60,65,70,75,80); x
f<-c(3,5,8,7,9,7,4,7)
N<-sum(f); N
m<-sum(x*f)/N; m
loggm<-sum(f*log(x,10))/N; loggm
gm<-10^loggm; gm
hm<-N/sum(f*(1/x)); hm
```

Output

```
Mean = 63.6
Geometric mean = 62.7429
Harmonic mean = 61.87485
```

2. The annual salaries of a group of employees are given in the following table.

Salaries (in 1000's)	45	50	55	60	65	70	75	80
no: of persons	3	5	8	7	9	7	4	7.

Calculate the mean, Geometric mean & Harmonic mean

procedure:

x	f	log x	xf	f/x	f log x
45	3	1.6532	135	0.0667	4.9596
50	5	1.6990	250	.1000	8.4949
55	8	1.7404	440	.1455	13.9229
60	7	1.7782	420	.1167	12.4471
65	9	1.8129	585	.1385	16.3162
70	7	1.8451	490	.1000	12.9157
75	4	1.8751	300	.0533	7.5002
80	7	1.9031	560	.0875	13.3216

$$\text{Mean} = \frac{\Sigma xf}{N} = 3180/50$$

$$= 63.6$$

$$GM = \text{antilog}(\Sigma f \log xi / N) = \text{antilog}(1.797564) = 62.74.$$

$$HM = \frac{N}{\Sigma f/x} = \frac{50}{.8082} = .61.87$$

Procedure

```
x <- 0:4 ; x
f <- c (19,18,8,4,1) ; f
z <- rep (x,f) ; z
median (z)
```

Output

median = 1

3. Find the median for the data

x	0	1	2	3	4
f	19	18	8	4	1

Procedure

x	f	cf
0	19	19
1	18	37
2	8	45
3	4	49
4	1	50

Median d.= size of $(N/2)^{th}$ item

= size of $(50/2)^{th}$ item

= size of 25^{th} item item

= 1

program

```
z<-c(72,74,40,60,82,115,41,61,65,83,53,110,46,84,50,67,
     78,79,56,65,68,69,104,73,59,81,66,49,77,90,84,
     76,64,64,70,72,50,79,50,79,52,103,96,51,86,78,
     94,80,79,74,52);z
xf<-table(z);xf
which(xf==max(xf))
```

output

79

4 Calculate the mode

72,74,40,60,82,115,41,61,65,83,53,110,46,84,50,67,
78,79,56,65,68,69,104,73,59,81,66,49,77,90,84;76,
64,64,70,72,50,79,52,103,96,51,86,78,94,80,
79,74,52)$

Procedure

Mode is the most occuring value.

Mode = 79.

5, Compute the mean, median and mode for the following data

class	145-150	150-155	155-160	160-165	165-170	170-175	175-180	180-185
f	4	6	28	58	64	30	5	5

Procedure:

class	x_i	f_i	$x_i f_i$	c.f.
145-150	147.5	4	590	4
150-155	152.5	6	915	10
155-160	157.5	28	4410	38
160-165	162.5	58	9425	96
165-170	167.5	64	10720	160
170-175	172.5	30	5175	190
175-180	177.5	5	887.5	195
180-185	182.5	5	912.5	200

Mean, $\bar{x} = \frac{\Sigma x_i f_i}{N}$

$= 165.175$

$$\text{Median} = l + \left(\frac{N/2 - cf}{f}\right) h$$

Median class $\Rightarrow$ 165-170

$\therefore l = 165 \quad cf = 96 \quad f = 64 \quad h = 5$

Median = 165.3125

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) h$$

Mode class: 165-170

$\therefore$ Mode = 165.75