Quartile, Deciles and Percentiles

(In case of continuous series)

In continuous series while calculating quartile, deciles and percentiles (N+1)/4, (N+1)/10 and (N+1)/100 would be replaced by N/4, N/10 and N/100 respectively.

The value would have to be interpolated as in case of median calculation

The following example would illustrate the above points :

Ques : from the following data compute the value of upper and lower quartile , D2, P90 and P5

Marks	No of Students
Below 10	8
10-20	10
20-40	22
40-60	25
60-80	10
Above 80	5
Total	80

Calculation of Q1 ,Q3 , D2 ,P90 and P5

Lower quartile or Q1= size of (N/4)th item =Size of (80/4) th = 20^{th} item
Q1 lies in the class 20-40

Q1 =L+{(N/4- CF)/F}*I
where :
L= lower limit of the class interval in which lower quartile lies , F= frequency of the interval in which lower quartile lies , CF= cumulative frequency of the class preceding the quartile class

Marks	No. of Students	C.F.
Below 10	8	8
10-20	10	18
20-40	22	40
40-60	25	65
60-80	10	75
Above 80	5	80

Now,

L=20, N/4=20 , CF= 18, F=22 and i= 20

Q1= 20+{(20-18)/22}*20

=20+1.82

=21.82

Upper Quartile or Q3= (3N)/4 TH item = Size of (3*80)/4 = 60th item

Hence Q3 lies in 40-60

Q3= L+{(3N/4-CF)/F}* i

Now,

L=40, (3N)/4=60 , CF=40, F=25 and i=20

Q3=40+{(60-40)-40}*20

=56

D2=Size of 2N/10th item =Size of 2*80/10=16th item

Hence D2 lies in the class 10-20

D2= L+{ (2N/10-CF)/F}*i

L=10, 2N/10=16, CF=8 , F=10 And i=10

D2= 10+{(16-18)/10}*10
=18

P90= Size of 90N/100TH item = Size of (90*80)/100 = 72th item

Hence P90 lies in the class 60-80

P90= L+{ (90N/100-CF)/F}*i

L=60 , 90N/100= 72, CF= 65, F=10 and i= 20

P90= 60={(72-65)/10}*20

=74

P5= Size of 5N/100TH item = Size of (5*80)/100 = 4th item

Hence P5 lies in the class interval 0-10

P5= L={(5N/100 –CF)/F}*i

L=0, 5N/100 = 4 , CF= O, F=8, i=10

P5= 0+{(4-0)/8}*10

=5

(It should be noted that if the quartile decile , etc. lies in first class, them the Cumulative frequency of the preceding class shall ne taken to be zero)

MODE

Mode is the value that has the greatest frequency density or the value that is most common in a data set

Calculation of mode in case of continuous series

Formula: $Mo = L + \{(FI - F0)/2F1 - F0 - F2\} * i$

Calculate the model income from the following

Income	No. of employees
10000-11500	8
11500-13000	12
13000-16000	30
16000-17500	3
17500-19000	2

Since the class interval are not equal throughout , we will take 1500 as class interval and adjust frequencies of the classes whose class interval is more than 1500 , the adjusted frequency distribution is as follows :

it is clear from the table that the model class lies in the class 13000-14500 (both the classes 13000-14500 and 14500-16000 have equal highest frequency i.e. 15 but since the concentration is more towards the 13000-14500 class we take it to be the modal class .)

Mode= L+{(F1-F0)/2F1-F0-F2}*I

Mo= 13000+{(15-12)/30 -12-15}*1500

=13000+1500

14500

Income	No. of workers
10000-11500	8
11500-13000	12- F0
13000-14500	15- F1
14500-16000	15-F2
16000-17500	3
17500-19000	2