



لجان الرفعات

STATISTICS



MORPHINE ACADEMY

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ACADEMY

Pharmaceutical Statistics

Lecture 4

Descriptive statistics

Worked Examples & Revision

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Solved Example

How do you construct a frequency table?

83	72	72	100	73
85	98	70	100	80
77	77	74	100	89
90	98	83	80	78
91	86	89	77	90
88	75	91	74	86
100	91	86	85	89
77	96	78	98	93
71	88	75	84	91
96	71	85	90	93

1. Identify the highest value (HV) and the lowest value (LV).
2. Calculate the range: $R = HV - LV$

$$R = 100 - 70 = 30$$

Solved Example

3. Find the number of class intervals, using Sturge's formula:

$$K = 1 + 3.3 \log N$$

K = number of class intervals

N = total number of observations

$$K = 1 + 3.3 \log 50$$

$$K = 6.61$$

$$K = 7 \text{ (rounded to the nearest whole number)}$$

Solved Example

4. Determine the class width.

$$\text{Class width} = \frac{R}{K}$$

$$\text{Class width} = \frac{30}{7} = 4.28$$

$$\text{Class width} = 5 \text{ (next whole number)}$$

5. The beginning of the 1st class interval (lower class limit) should be near the lowest value and be a multiple of the class width.

Solved Example

lower class limit
upper class limit

70 – 74 (70,71,72,73,74)

75 – 79

80 – 84

85 – 89

90 – 94

95 – 99

100 – 104

Tip: lower class limit
should be a multiple of
the class width

*Class limits do
not overlap.*

Solved Example

7. Obtain the class boundaries.

Subtract 0.5 from each lower class limits and add 0.5 to each upper limits.

70 – 74

69.5 – 74.5

75 – 79

74.5 – 79.5

80 – 84

79.5 – 84.5

85 – 89

84.5 – 89.5

90 – 94

89.5 – 94.5

95 – 99

94.5 – 99.5

100 – 104

99.5 – 104.5

Solved Examples

8. Find the midpoint or class mark of each class interval.

$$\text{Class mark} = \frac{\text{lower limit} + \text{upper limit}}{2}$$

70 – 74	72
75 – 79	77
80 – 84	82
85 – 89	87
90 – 94	92
95 – 99	97
100 – 104	102



Class marks
also follow the
class width.

Solved Example

Frequency Distribution Table

Class Interval	Class Boundary	Class Mark (midpoint)	Frequency	^{freq} <u>tot Freq---</u> Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
70-74	69.5-74.5	72	8	0.16 $\frac{8}{50}$	8	0.16 $\frac{8}{50}$
75-79	74.5-79.5	77	8	0.16	16	0.32
80-84	79.5-84.5	82	5	0.1 $\frac{5}{50}$	21	0.42
85-89	84.5-89.5	87	11	0.22	32	0.64
90-94	89.5-94.5	92	9	0.18	41	0.82
95-99	94.5-99.5	97	5	0.1	46	0.92
100-104	99.5-104.5	102	4	0.08	50	1
			50	1		

Solved Example

Calculate the mean?

Class Interval	midpoint of class x	Frequency f	Product of fx
70-74	72	8	576
75-79	77	8	616
80-84	82	5	410
85-89	87	11	957
90-94	92	9	828
95-99	97	5	485
100-104	102	4	408
		$\sum xf$	4280

$$n = \sum f$$

so using the formula $\bar{X} = \frac{\sum xf}{n}$, the **mean** is $= 4280/50 = 85.6$

Solved Example

Calculate the median (m)?

	Class Interval	Frequency f	Cumulative Frequency (cf)	
	70-74	8	8	
	75-79	8	16	
	80-84	5	21	F
Class median	85-89	11	32	f_m
	90-94	9	41	
	95-99	5	46	
	100-104	4	50	n

$i=5$, $L_m=84.5$, use the formula $m = L_m + \left(\frac{\frac{n-F}{2}}{f_m} \right) i$

Median = 86.3

Solved Example

Calculate the Mode?

	Class Interval	Frequency f	
	70-74	8	
	75-79	8	
	80-84	5	$\Delta_1 = (11-5) = 6$
Modal class	85-89	11	$L_{mo} = 84.5$
$i = 5$	90-94	9	$\Delta_2 = (11-9) = 2$
	95-99	5	
	100-104	4	

Use the formula $\text{Mode} = L_{mo} + \left(\frac{\Delta_1}{\Delta_1 + \Delta_2} \right) i$

Mode = 88.3

Solved Example

- In this worked example:
 - Mean=85.6
 - Median=86.3
 - Mode=88.3
 - So Mode>Median>Mean
 - Is data normally distributed? If not, so what?!
 - Is data skewed left or right?
 - So the tail of distribution is on the left or right hand??