U3A Maths

4-Mar-2022 Term 1/Week 5

Relative Frequency

Review (Homework) [Refer Week 4 Notes]

H.W (1.) Test scores of Prof. Smith's class

20, (15), 26, 32, 18, 28, 35, (14), 26, 22, 17

Students who got a z-score of less than −1 will fail.

We have $z = \frac{x - \mu}{\sigma}$

We need to calculate Mean (μ) and Std. dev (σ)

Calculating: $\mu = 23$, $\sigma = 6.633$

we have $x = \mu + z\sigma$

$= 23 + (-1)(6.633)$

$= 16.367$

(2 Students fail!)

Students with score of < 16.367 fail!

H.W (2) Lengths of leaves from an oak tree are given.

(a) prepare grouped frequency table

we have $n = 38$ (No. of data values)

No. of groups $= \sqrt{n} = \sqrt{38} = 6.17$

(say 6 groups)

Group or class width

$= \frac{x_{max} - x_{min}}{\text{No. of Groups}} = \frac{18 - 1}{6}$

$= 2.8$

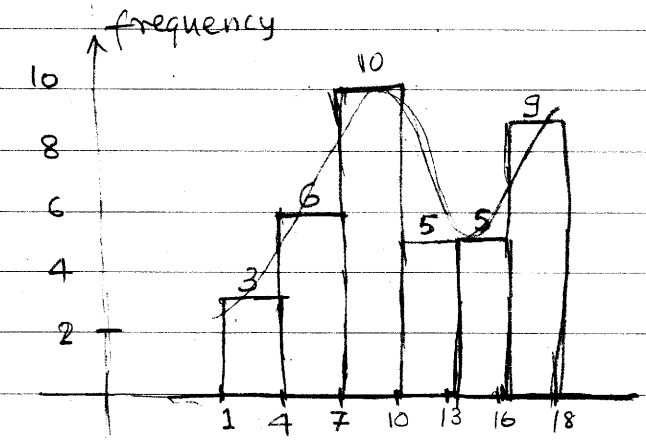
(say 3 cms).

We can now prepare the freq. table from given data values

Group (class)	Frequency (f)
1 – 3	3
4 – 6	6
7 – 9	10
10 – 12	5
13 – 15	5
16 – 18	9

$n = \Sigma f = 38$

(b) Histogram



- Note that the distribution is not "Normal" distribution!
- However it is still possible to perform statistical analysis using "sample means" and central limit theorem
- We need to calculate the "population mean" (μ) and "population Std. Dev (σ)

(c) Population Mean & Std. Dev.

$\mu = 10.16$ cm

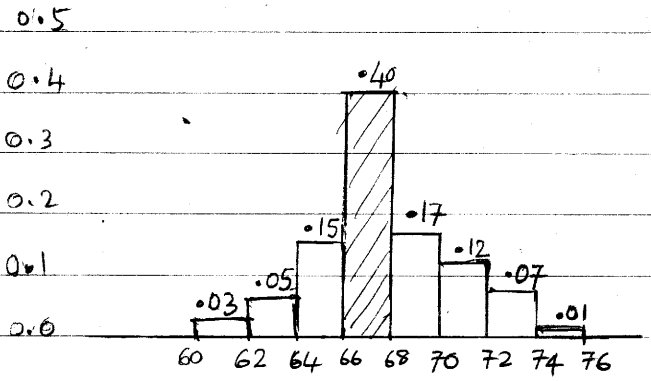
$\sigma = 4.83$ cm

using "mathsisfun.com" website "Standard deviation calculator"!!

- The heights of 200 male soccer players (in inches) are given in the following Grouped Frequency Table. (Con page 6)
- The data can be considered as "continuous", since the heights are measured using a graduated scale.
- For the given "frequency value", we can calculate the "relative frequency" as a ratio of frequency to the no. of data values. ('n' or 'Σf'); which is 200 in our case.

Group (class)	Freq (f)	Relative Freq.
60 - 62	6	0.03
62 - 64	10	0.05
64 - 66	30	0.15
66 - 68	80	0.40
68 - 70	34	0.17
70 - 72	24	0.12
72 - 74	14	0.07
74 - 76	2	0.01
	$\Sigma f = 200$	1.00

- We can now plot the "Histogram" using Relative Frequency values



- The "beauty" of relative freq. is that it provides the "probability" of the data values in that group.
- Let us "define" that relative frequency of the group is the "hatched area" in the bar chart - as shown for the group "66-68" above

- In other words, we can say that the "probability" of the soccer player's height between 66 to 68 inches is 0.4 (40%)
- Extending the same logic, we can say that the probability of the soccer player's height between 66 to 70 inches is $0.4 + 0.17 = 0.57$ (57%)
- We can also say, the probability of the height between 66 to 67 inches is $0.4/2 = 0.2$ (20%) that is "half the area" approx!?
- We can now do a lot of interesting analysis!!