UTM

UNIVERSITI TEKNOLOGI MALAYSIA

Group 2

SECI1143-03

Assignment 2

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Question 1

Original scores : 85, 90, 75, 88, 92, 80, 85, 82, 90, 85

(a) mean =

$$\frac{85 + 90 + 75 + 88 + 92 + 80 + 85 + 82 + 90 + 85}{10}$$

$$= \frac{852}{10} = 85.2$$

median

sorted data : 75, 80, 82, 85, 85, 85, 88, 90

$(10 + 1) \div 2 = 5.5$

∴ median = average of the 5th and 6th terms : $(85 + 85) \div 2 = 85$

mode = 85 (appears 3 times)

(b) Interpretation :

- The scores are quite consistent (mean, median and more are close)
- most student scored around 85
- Since there are no extreme values, mean is a suitable summary

(c) New scores : 55, 65, 65, 70, 85, 95, 95, 95, 100, 100

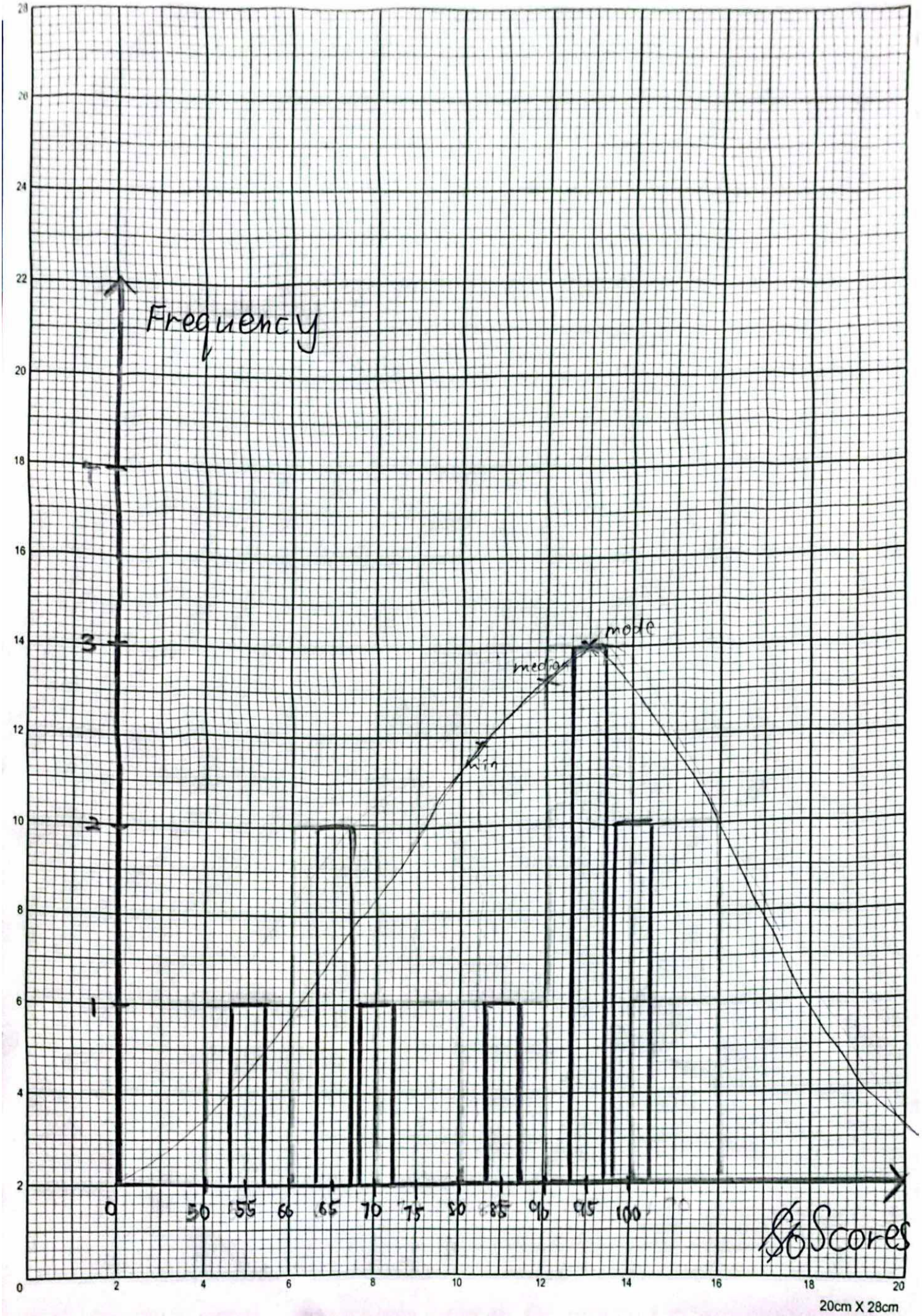
mean =

$$\frac{55 + 65 + 65 + 70 + 85 + 95 + 95 + 95 + 100 + 100}{10} = \frac{825}{100} = 82.5$$

median : sorted data : 55, 65, 65, 70, 85, 95, 95, 95, 100, 100

$(85 + 95) \div 2 = 90$

mode = 95 (appears 3 times)


Frequency
3
2
1
mode
median
mean
0
50
55
60
65
70
75
80
85
90
95
100
Scores
20cm X 28cm

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(iii) Comparison

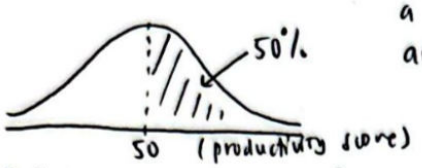
- mean dropped from 85.2 - 82.5
- median increases from 85 - 90
- mode changed from 85 to 95
- New scores are more spredd out
- New scores are less consistent but some students performed better
- ~~The~~

Question 2

$X \sim N(50, 10^2)$

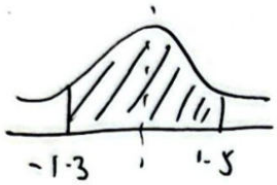
Based on graph,
- if we assume "increase in productivity" as getting a score above 50, then 50% of employees showed an increase in productivity after the training.

a)



b) $P(37 \leq X \leq 65) = P\left(\frac{37-50}{10} \leq Z \leq \frac{65-50}{10}\right)$

$= P(-1.3 \leq Z \leq 1.5)$



$= P(Z \leq 1.5) - P(Z \leq -1.3)$

$= 0.93319 - 0.09680$

$= 0.83639$

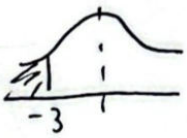
≈ 0.836

c) $n = 1000$

cost = 200 /head

$P(X \leq 20) = P\left(Z \leq \frac{20-50}{10}\right)$

$= P(Z \leq -3)$



$= 0.00135$

number of employees expected to achieve less than 20 $= 0.00135 \times 1000$

$= 1.35$

≈ 1 person

Estimated budget $= 1 \times 200$

$= RM200$

d) $P(X > x) = 0.05 \quad (Z = 1.64)$

$\frac{X-50}{10} = 1.64$

$X = 66.4$

$\therefore$ minimum score is 66.4.

3. (a) Negative Binomial Distribution $(r=4, p=0.7)$

(b) $\theta = \sqrt{\frac{r(1-p)}{(p)^2}} = \sqrt{\frac{4(1-0.7)}{(0.7)^2}} = 1.565$

(c) $P(X=6) = \binom{6-1}{4-1}(0.70)^4(1-0.70)^{6-4}$

$= 0.2161$

(d) Bmomial Distribution $(n=12, p=0.70)$

$P(X=7) = \binom{12}{7}(0.70)^7(1-0.7)^{12-7}$

$= 0.1585$