NO

Date

Question 1

a) Mean $= \frac{\Sigma fx}{n}$

class interval	x	Frequency	fx
$150 \leq x < 160$	155	12	1860
$160 \leq x < 170$	165	20	3300
$170 \leq x < 180$	175	5	875
$180 \leq x < 190$	185	3	555

$n = 40$ $\quad \Sigma fx = 6590$

$\bar{x} = \frac{\Sigma fx}{n}$

$= \frac{6590}{40}$

$= 164.75$

b) Median $= L + \frac{\frac{N}{2} - cf_p}{f_{med}}(w)$

class interval	Frequency	cf
$150 \leq x < 160$	12	12
$160 \leq x < 170$	20	32
$170 \leq x < 180$	5	37
$180 \leq x < 190$	3	40

$n = 40$

$\frac{N}{2} = \frac{40}{2} = 20$

median class $= 160 - 170$

$L = 160$

$cf_p = 12$

$f = 20$

$w = 170 - 160$

$= 10$

median $= L + \frac{\frac{N}{2} - cf_p}{f}(w)$

$= 160 + \frac{20 - 12}{20}(10)$

$= 164$

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

class interval	f
$150 \leq x < 160$	12
$160 \leq x < 170$	20
$170 \leq x < 180$	5
$180 \leq x < 190$	3

$l = 160$

$h = 10$

$f_1 = 20$

$f_0 = 12$

$f_2 = 5$

mode $= 160 + 10\left(\frac{20 - 12}{2(5) - 12 - 5}\right)$

$= \frac{1040}{7}$

$= 148.571$

d) Modal class $= 160 \leq x < 170$

QUESTION 2

85 90 75 88 92 80 85 82 90 85

a) calculate mean, median and mode

mean

$$\bar{x} = \frac{\Sigma x_i}{n}$$

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

$$= 85.2 \ \#$$

median

arrange :

75 80 82 85 85 85 88 90 90 92

(10+1) ÷ 2 = 5.5

≈ 5th and 6th

median

$$= \frac{85 + 85}{2}$$

$$= 85 \ \#$$

mode

$$= 85 \ \#$$

b) Interpret what these values (mean, median, mode) suggest about the performance of students in the quiz. Based on this value, which statistic that more appropriate represent the summary of the score.

- The mean score (82.5) is the average performance of students in the quiz.

- The median score (85) is the middle value of the score.

- The mode score (85) is the most common score among the students.

- Mean is more appropriate summary statistic because it is less affected by extreme values.

c) Later you rely on that same of the scores are wrongly recorded and new scores as follows :

55, 65, 65, 70, 85, 95, 95, 95, 100, 100

i. Calculate mean, median and mode of the new dataset.

mean

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

$$= 82.5 \#$$

median

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

$\approx$ 5th and 6th

5th = 85

6th = 95

$$= \frac{85 + 95}{2}$$

$$= 90 \#$$

mode

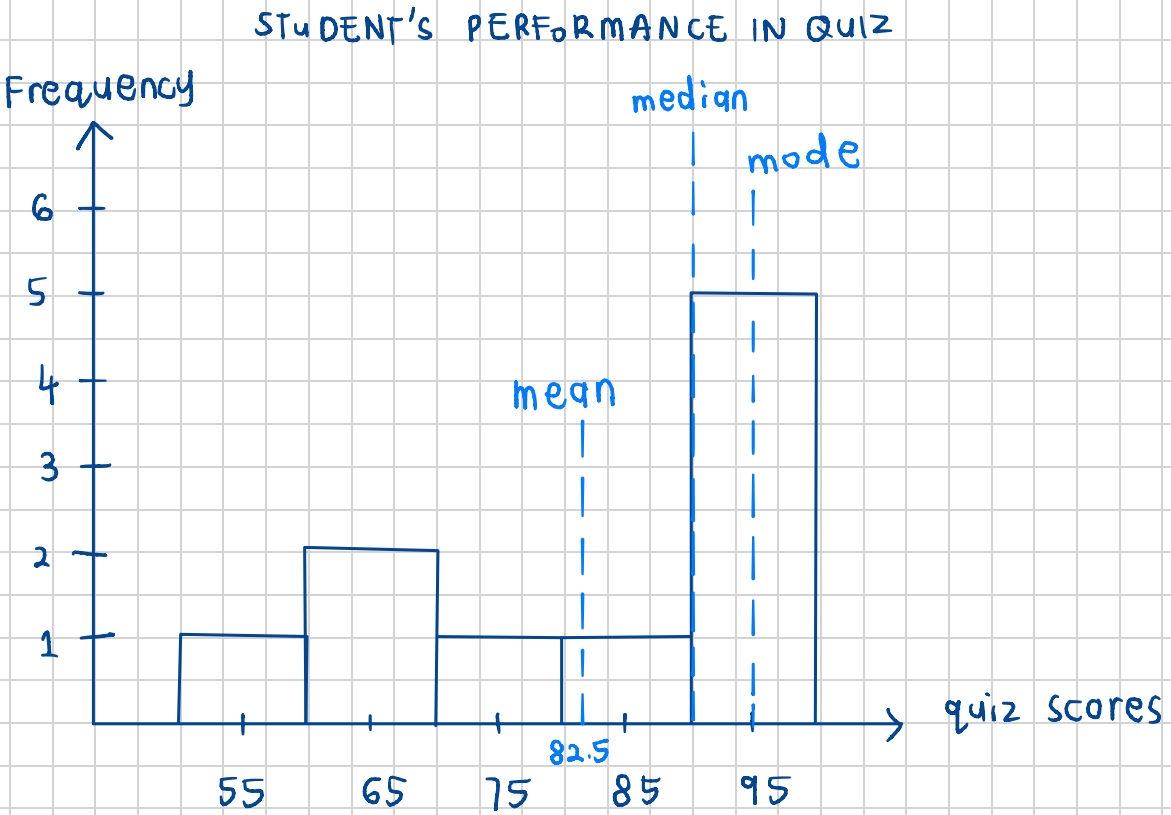
$= 95 \#$

ii. Plot the graph of central tendency

55	I	85	I
65	II	95	III
70	I	100	II

mean = 82.5
median = 90
mode = 95

cell boundaries	midpoint	frequency
50 - 60	55	1
60 - 70	65	2
70 - 80	75	1
80 - 90	85	1
90 - 100	95	5



iii. Evaluate the exact performance of the student of this data compared to previous data.

- The new mean (82.5) is less than previous dataset (85.2).
- The new median (90) is higher than previous dataset (85).
- The new mode (95) is higher than previous dataset (85).

Question 3

a) i. Range

$40 - 25 = 15$

ii. Variance

$$\bar{x} = \frac{25 + 27 + 28 + 29 + 30 + 31 + 32 + 33 + 35 + 36 + 38 + 40}{12}$$

$= 32$

$$s^2 = \frac{\Sigma (x - \bar{x})^2}{n-1}$$

$$= \frac{(25-32)^2 + (27-32)^2 + (28-32)^2 + (29-32)^2 + (30-32)^2 + (31-32)^2 + (32-32)^2 + (33-32)^2 + (35-32)^2 + (36-32)^2 + (38-32)^2 + (40-32)^2}{12-1}$$

$= 20.909$

iii. standard deviation

$\sqrt{20.909} = 4.573$

b) The range of 15 thousands ringgit shows the difference between the highest and lowest monthly sales figure throughout the year.

The variance of 20.909 shows the measure of dispersion of sales figure around the mean value. The standard deviation of 4.573 measures how far apart numbers are in the sales figure data set.

c) This understanding can help to make strategic decisions to budget and plan the inventory or products to match the expected demand, especially during peak sales and slower sales periods.

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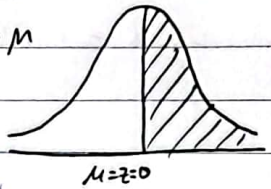
Assignment 2 PSDA

Question 4

$\mu = 50$, $\sigma = 10$

a) showed an increase in productivity : $X \geq \mu$



$P(X \geq 50) = P(z \geq \frac{50-50}{10})$

$= P(z \geq 0)$

$= 1 - 0.5$

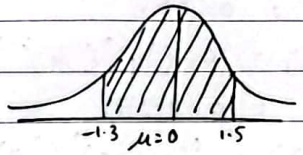
$= 0.5$

$\therefore$ $0.5 \times 100 = 50\%$ of the employees will show an increase in productivity after the training program.

b) $P(37 \leq x \leq 65)$

$z = \frac{37-50}{10} = -1.3$

$z = \frac{65-50}{10} = 1.5$



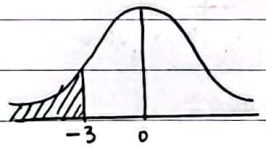
$P(-1.3 \leq z \leq 1.5) = P(1.5) - P(-1.3)$

$= 0.93319 - 0.09680$

$= 0.836$

c) $P(X \leq 20)$

$z = \frac{20-50}{10} = -3$



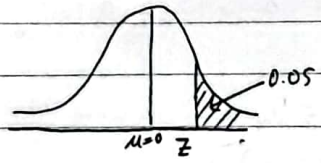
$P(z \leq -3) = 0.00135$

Percentage $= 0.00135 \times 100 = 0.135\%$

number of people $= 0.135\% \times 1000 = 135$ people.

Total estimated budget $= 135 \times RM\ 200 = RM\ 27\,000$.

d) $P(z \geq \frac{X-50}{10}) = \frac{5}{100} = 0.05$



from the table :

$z = 0.13$

$\frac{X-50}{10} = 0.13$

$X = 51.3$

$\therefore$ minimum score for top 5% is 51 units

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Assignment 2 : PDSA

Question 5

a) random variable X = number of correct answer.

b) $p = 1/4$, $q = 3/4$, $n = 6$

$P(X=x) = \binom{n}{x} p^x q^{n-x}$

$X = 0$, $P(X=0) = \binom{6}{0} (1/4)^0 (3/4)^{6-0}$

$= 0.178$

$X = 1$, $P(X=1) = {}^6C_1 (1/4)^1 (3/4)^{6-1}$

$= 0.356$

$X = 2$, $P(X=2) = {}^6C_2 (1/4)^2 (3/4)^{6-2}$

$= 0.297$

$X = 3$, $P(X=3) = {}^6C_3 (1/4)^3 (3/4)^{6-3}$

$= 0.132$

$X = 4$, $P(X=4) = {}^6C_4 (1/4)^4 (3/4)^{6-4}$

$= 0.033$

$X = 5$, $P(X=5) = {}^6C_5 (1/4)^5 (\frac{3}{4})^{6-5}$

$= 0.004$

$X = 6$, $P(X=6) = {}^6C_6 (1/4)^6 (3/4)^{6-6}$

$= 0.0002$

Table Probability of X :

x	P(X=x)
0	0.178
1	0.356
2	0.297
3	0.132
4	0.033
5	0.004
6	0.0002

c) $\mu = np = (6)(1/4)$

$= 1.5$ ✱

d) $P(X \geq 3) = P(X=3) + P(X=4) + P(X=5) + P(X=6)$

$= 0.132 + 0.033 + 0.004 + 0.0002$

$= 0.1692 = 0.169$ ✱

e) $x = 4$, $p = 1/4$

$P(x) = (1-p)^{x-1} p$

$P(4) = (1 - 1/4)^{4-1} (1/4)$

$= 0.105$ ✱

Question 6

$p = 0.70$ ← order cappucino.

X = no. of customers that will arrive until the 4th customer who orders a cappucino.

a) $P(X = 4) = (1 - 0.70)^{4-1}(0.70)$

$= 0.0189$

$= 0.019$

b) standard deviation, $\sigma = \sqrt{\frac{(1-p)}{p^2}}$

$= \sqrt{\frac{(1-0.70)}{(0.70)^2}}$

$= 0.782$

c) $b^*(6; 4, 0.70) = \binom{6-1}{4-1}(0.70)^4(0.30)^{6-4}$

$= \binom{5}{3}(0.70)^4(0.30)^2$

$= 0.216$

d) $b(x; n, p) = \binom{n}{x} p^x q^{n-x}$

$b(7; 12, 0.7) = \binom{12}{7}(0.70)^7(0.30)^5$

$= 0.158$