Que ⟹ In an exam taken by 500 candidates, the average and S.D. are 40% and 10%. Find approx. normal dist.

(a) How many will pass, if 50% is fixed as a min.

(b) what should be the minimum, if 350 candidates are to pass.

(c) How many have scored marks above 60 %.

Soln ⟹

$\mu = 0.4$ and $\sigma = 0.1$

(i) How many will Pass, if 50% is fixed as a min, $P(50\% < x < \infty) = ?$

$$z_1 = \frac{a-\mu}{\sigma} = \frac{0.5-0.4}{0.1} = 1$$

$$z_2 = \frac{b-\mu}{\sigma} = \infty$$

$$P(z) = F(z_2) - F(z_1)$$

$$= F(\infty) - F(1)$$

$$= 0.5 - 0.3413 = 0.1587$$

required result is for 500 candidates

$$= 0.1587 \times 500$$

$$= 79$$

(ii) What should be min if 350 candidates are to pass?

Let z_1 be the min value which is required

$P(z_1 \leq z \leq \infty) = F(z_2) - F(z_1)$

Probability $= \frac{350}{500}$

$$\frac{350}{500} = F(\infty) - F(z_1)$$

$$F(z_1) = 0.5 - \frac{35}{50} = 0.5 - 0.7$$

$$= -0.2$$

So $z_1 = -0.52$ (By Antinormal table)

then required result is

$$z_1 = \frac{a-\mu}{\sigma} \Rightarrow -0.52 = \frac{a-0.4}{0.1}$$

$$a = 0.3480$$

$$a = 35\%$$

(c) How many have scored marks above 60%

$P(60\% \leq x \leq \infty) = ?$

$$z_1 = \frac{a-\mu}{\sigma} \Rightarrow \frac{0.6-0.4}{0.1} = \frac{0.2}{0.1}$$

$$z_1 = 2$$

&

$$z_2 = \frac{b-\mu}{\sigma} = \infty$$

$$P(z) = F(z_2) - F(z_1)$$
$$= F(\infty) - F(2)$$
$$= 0.5 - 0.4772 = 0.0228$$

required result $= 0.0228 \times 500$

$= 11.4$ Ans

Que: Fit a normal curve for the data

x:	2	4	6	8	10
f(x):	1	4	6	4	1

Sol:

mean $\mu = \frac{\Sigma f_i x_i}{\Sigma f_i} = 6$

Formula S.D. $\sigma = \sqrt{\left\{\frac{\Sigma f_i (x_i^2)}{\Sigma f_i}\right\} - \left(\frac{\Sigma f_i x_i}{\Sigma f_i}\right)^2}$

$$= \sqrt{\frac{1(2)^2 + 4(4)^2 + 6(6)^2 + 4(8)^2 + 1(10)^2}{16} - \left(\frac{96}{16}\right)^2}$$

$= 2$

Table

Mid x	(x_1, x_2)	(z_1, z_2) * $z_1 = \frac{a-\mu}{\sigma} / z_2 = \frac{b-\mu}{\sigma}$	Area under the curve * $F(z_2) - F(z_1) = P(z)$	Best fit * $P(z) \times \Sigma f_i$
2 1 ↙ ↘ 3	(1,3) a b	$z_1 = \frac{1-6}{2} = -2.5$ ✓ $z_2 = \frac{3-6}{2} = -1.5$ ✓	$F(-1.5) - F(-2.5)$ $= -0.4322 + 0.4938$ $= 0.0606$ ✓	$.16 \times 0.0606$ $= 0.97$ ✓
4 3 ↙ ↘ 5	(3,5)	$(-1.5, -0.5)$	0.2417	3.9
6 5 ↙ ↘ 7	(5,7)	$(-0.5, 0.5)$	0.383	6.1
8 7 ↙ ↘ 9	(7,9)	$(0.5, 1.5)$	0.2417	3.9
10 9 ↙ ↘ 11	(9,11)	$(1.5, 2.5)$	0.606	0.97

Best fit of Given data is →

x	2	4	6	8	10
f	0.97	3.9	6.1	3.9	0.97

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