

1. George throws a ball at a target 15 times.

Each time George throws the ball, the probability of the ball hitting the target is 0.48

The random variable X represents the number of times George hits the target in 15 throws.

(a) Find

(b) contd $P(Y > 110.5) = 1 - P(Y < 110.5)$

$$= 1 - P(Z < \frac{110.5 - 120}{\sqrt{62.4}}) \text{ where } Z \sim N(0, 1^2)$$

(i) $P(X = 3)$

(ii) $P(X \geq 5)$ fx-991EX: Menu 7-Dist/Normal CD/Variable
fx-CG50: Menu 2-Stats/DIST/NORM/Ncd/Variable (3)

George now throws the ball at the target 250 times.

$$= 1 - 0.1145 \dots = 0.8854 \dots = 0.885 \text{ 3sf (1 mark)}$$

(b) Use a normal approximation to calculate the probability that he will hit the target more than 110 times.

(3)

(a) (i) $X \sim B(15, 0.48)$ (1 mark)

$$P(X=3) = {}^{15}C_3 \cdot 0.48^3 \cdot (1-0.48)^{15-3}$$

fx-991EX: Menu 7-Distribution/Binomial PD/Variable

fx-CG50: Menu 2-Statistics/DIST/BINOMIAL/Bpd/Data-Variable
 $= 0.01966 \dots = 0.0197 \text{ 3sf (1 mark)}$

(ii) $P(X \geq 5) = 1 - P(X \leq 4)$

for $P(X \leq 4)$,

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$$P(X \leq 4) = 0.07986 \dots$$

$$1 - 0.07986 \dots = 0.9201 \dots = 0.920 \text{ 3sf (1 mark)}$$

(b) Let Y be no. of hits in 250 trials

$$Y \sim B(250, 0.48) \approx N(np, npq)$$

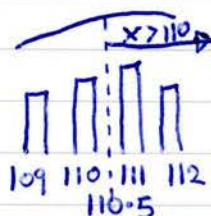
$$\approx N(250 \times 0.48, 250 \times 0.48 \times (1-0.48))$$

$$\approx N(120, (\sqrt{62.4})^2)$$

μ σ^2

$$P(X > 110) \approx P(Y > 110.5)$$

continuity correction



(1 mark)