

1. (a) State one disadvantage of using quota sampling compared with simple random sampling. (a) quota sampling is not random (every element does not have an equal chance of selection). So inferences about the population are not reliable. (1 mark)

In a university 8% of students are members of the university dance club.

<https://fineview.academy>

A random sample of 36 students is taken from the university.

The random variable X represents the number of these students who are members of the dance club.

- (b) Using a suitable model for X , find (b) $X \sim B(36, 0.08)$ (1 mark)

(i) $P(X=4)$ (b)(i) ${}^{36}C_4 (0.08)^4 (1-0.08)^{36-4} = {}^{36}C_4 0.08^4 0.92^{32}$

(ii) $P(X \geq 7)$ but can use calculator directly
fx-991EX: MENU 7 - Dist / Binomial PD / Variable
fx-CG50: MENU 2 - Stats / DIST / Binomial / Bpd / Variable (3)

Only 40% of the university dance club members can dance the tango. $\Rightarrow 0.1673...$
 $= 0.167$ 3sf (1 mark)

- (c) Find the probability that a student is a member of the university dance club and can dance the tango.

(1)

A random sample of 50 students is taken from the university.

- (d) Find the probability that fewer than 3 of these students are members of the university dance club and can dance the tango.

(2)

(b)(ii) $P(X \geq 7) = 1 - P(X \leq 6)$

$$P(X \leq 6) = \left\{ \begin{array}{l} \text{fx-991EX: MENU 7 - Dist / Binomial CD / Variable} \\ \text{fx-CG50: MENU 2 - Stats / DIST / Binomial / Bcd / Variable} \end{array} \right\}$$

$= 0.9777...$

$1 - 0.9777... = 0.02223... = 0.0222$ 3sf (1 mark)

(2) Let T be no. of students who can dance the Tango

$$P(A|B) = \frac{P(A \cap B)}{P(B)} \Rightarrow P(A \cap B) = P(A|B) \times P(B)$$

$$P(\text{Can Dance Tango} \cap \text{In Dance Club}) = P(\text{Can Dance Tango} | \text{In Dance Club}) \times P(\text{In Dance Club})$$

$$= 0.4 \times 0.08$$

$$= 0.032 \quad (1 \text{ mark})$$

(d) Let T be no. of students who can dance Tango.

$T \sim B(50, 0.032)$ (1 mark)

$P(T < 3) = P(T \leq 2)$ (for discrete distribution)

$= \left\{ \begin{array}{l} \text{fx-991EX: ... Binomial CD ...} \\ \text{fx-CG50: ... Bcd ...} \end{array} \right\} = 0.7850... = 0.785$ 3sf (1 mark)