**0770 P3 MARK GUIDE MOCK 2026**

**1)** a) $P(B) = P(A^1 \cap B) + P(A \cap B) = \frac{23}{63}$ **M1M1A1**

b) $P(A|B) = \frac{14}{23}$ **M1A1**

c) $P(A^1|B) = 1 - P(A|B) = \frac{9}{23}$ **M1A1**

ii) Tree diagram **1**

a) $P(F) = \frac{42}{100}$ **M1A1**

b) $P(B|F) = \frac{4}{7}$ **M1A1**

2 most popular candidates are the male from list A with 504 votes and the female candidate from list B with 288 votes. **1 mark**

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**2.** $\sum f = 150, \sum fx = 4327, \sum fx^2 =$

a) $\sum f = 150$ **1**

b) $\bar{X} = \frac{\sum fx}{\sum f} = \frac{4327}{150} = 28.18$ **M1M1A1**

c) $\sigma = \sqrt{\frac{19125}{150}} \approx 35.18$ **M1A1**

c.f graph (plot,shape,scale) **1,1,1**

d) median$\approx 28.5$ **M1A1**

e) $Q.D = \frac{Q_3 - Q_1}{2} \approx 6$ **M1A1**

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**3.** $\sum P(X = x) = 1 => k = \frac{25}{36}$ **M1M1A1**

b) E(X)=$\sum xP(X = x) = \frac{55}{36}$ **M1A1**

c) $E(X^2) = \sum x^2 P(X = x) = \frac{155}{36}$ **M1**

$Var(X) = E(X^2) - E(X) = \frac{155}{36} - \left(\frac{55}{36}\right)^2 = \frac{2555}{1296}$ **M1M1A1**

ii) $E(Y) = 3E(X) + 4 = \frac{103}{12}$ **M1A1**

$Var(Y) = 3^2 Var(X) = \frac{2555}{4}$ **M1A1**

**4.** X is crv if $\int f(x)dx = 1$ **M1M1A1**

$$=> \int_2^3 (2x - 4)dx = -3 + 4 = 1$$

$$=> X \ is \ a \ CRV$$

b) $E(X) = \int xf(x)dx = \frac{8}{3}$ **M1A1**

c) $\int_2^m (2x^2 - 4x)dx = \frac{1}{2} => m = 2.707$ **M1M1A1**

d) $\int_2^{q_3} f(x)dx = \frac{3}{4} => q_3 = 2.866$ **M1A1**

$\int_2^{q_1} f(x)dx = \frac{1}{4} => q_1 = 2.5$ **A1**

$I.Q.R = 0.366$ **M1A1**

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**5.** (i) $X \sim P_0(5)$ in 20minutes

a) $P(X = 0) = e^{-5} = 0.0067$ **M1A1**

b) $\lambda = 3x5 = 15$ **B1**

$P(X = 5) = \frac{e^{-15}15^5}{5!} \approx 0.00019$ **M1M1A1**

(ii) $p = \frac{1}{5}$

c) mean=$\frac{1}{p} = 5$ $Var(X) = \frac{q}{p^2} = 20$ **M1M1A1**

d) $P(X = 5) = q^4 p \approx 0.0819$ **M1A1**

Least integer n such that $P(X > n) < 1\%$

$$=> q^n < 0.01$$

$$n\log\frac{4}{5} < \log 0.01$$

$n = 21$ **M1A1**

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**6.** $\bar{x} = \frac{\sum x}{n} = \frac{16830}{10} = 163.8g$ **M1**

$$s^2 = \frac{\sum x^2 - \frac{\sum x)^2}{n}}{n - 1}$$

$s \approx 8.09$ **A1**

For 96% C.I: $z_a = 2.05$

$=> (163.8 \pm 2.05(\frac{8.09}{\sqrt{100}})$ **M1**

$=> (162.14, 165.46)$ **A1**

b) An estimator is unbiased if $E(S^2) = \sigma^2$ **A1**

(ii) $\mu = 2, \sigma^2 = \frac{2}{3}$ **M1M1A1**

c) all possible samples of size 2 **M1A1**

=>

(1,1),(1,2),(1,3),(2,1),(2,2),(2,3),(3,1),(3,2),(3,3)

Sample means: 1,1.5.2,2.5,3 **M1**

$E(X) = \frac{18}{9} = 2$ ,

$E(S^2) = \frac{\sum(X_I - \bar{X})^2}{n} = \frac{6}{9} = \frac{2}{3}$ **M1A1**

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**7.**(i) correct definitions **(1,1,1,1)**

(ii) $H_0: \mu = 42.3$ B1B1

) $H_1: \mu > 42.3$ one-tailed test at 1% level

Reject ) $H_0$ if $|Z| > 2.326$ **M1M1A1**

$Z = \frac{49.8 - 42.3}{\frac{11.2}{\sqrt{15}}} = 2.593 > 2.326$ **M1M1A1**

We conclude that at 1% level, there is sufficient evidence that the students performed better than the candidates. **A1**

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**8.** $n = 10, \sum x = 145, \sum y = 145,$ **M1A1M1A1**

$\sum xy = 2095$

$\sum x^2 = 2185$ $\sum y^2 = 2185$

a) $r = \frac{S_{XY}}{S_X S_{XY}} = -0.09$ **M1M1M1A1**

b) Y/X $=> y = -0.09x + 15.81$ **M1M1A1**

c) $y = -0.09(19) + 15,81 = 17$ **M1A1**

M1=51, B1=3, A1=38, C=10 (Total=102)