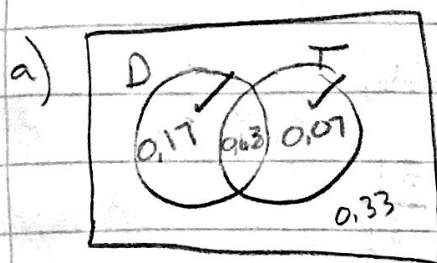


2019

AP Trial Paper 2 Memo

Question 1



$$P(D \cup T) = 0.17 + 0.43 + 0.07 \quad \checkmark_{ca}$$

$$= 0.67 \quad \checkmark_{ca} \quad (4)$$

b) $1 - 0.67 \quad \checkmark_m$

$$= 0.33 \quad \checkmark_{ca}$$

(2)

c) $P(D|T) = \frac{P(D \cap T)}{P(T)} \quad \checkmark_m$

$$= \frac{0.43}{0.5} \quad \checkmark_a$$

$$= 0.86 \quad \checkmark_{ca}$$

(3)

d) $P(D \cap T) = 0.43 \quad \checkmark_a$

$$P(D) \times P(T) = 0.6 \times 0.5 \quad \checkmark_m$$

$$= 0.3 \quad \checkmark_a$$

$$\therefore P(D \cap T) \neq P(D) \times P(T) \quad \checkmark_{ca} \quad (4)$$

e) $P(\text{all 4}) = 0.6 \times 0.5 \times 0.67 \times 0.47 \quad \checkmark_m$

$$= 0.0945$$

$\checkmark_a$

(2)

f) $P(\text{none}) = 0.4 \times 0.5 \times 0.33 \times 0.53 \quad \checkmark_m$

$$= 0.0350 \quad \checkmark_{ca}$$

(2)

Question 2

$$2.1) \text{ Vowel order} = \frac{5!}{3!} = 20$$

Total letters (A)(B)(A)(A)(T)(N) (vowels)

$$\text{no. of arrangements} = \frac{7!}{2!} \times \frac{5!}{3!}$$

$$= 2520 \times 20$$

$$= 50400 \text{ } \checkmark \text{ca} \quad (5)$$

$$2.2) \quad \underline{3} \quad \underline{5} \quad \underline{\square} \quad \underline{\square} \quad \underline{\square} \quad \underline{\square}$$

8 7 6 5 $\checkmark$ m

$$8 \times 7 \times 6 \times 5 = 1680 \quad \checkmark \text{a}$$

$$2.3) \binom{7}{3} \binom{2}{1} + \binom{2}{0} \binom{7}{4} \quad \text{or} \quad \binom{9}{4} - \binom{7}{2}$$

no. of choices (2)
P(defs choosing)

$$70 + 35 = 105 \quad \checkmark$$

$$126 - 21 = 105 \quad \checkmark$$

(4)

$$2.4) \frac{\binom{4}{3} \binom{5}{3} \binom{8}{3}}{\binom{17}{9}} = 0.0921 \text{ } \checkmark \text{ca}$$

$\checkmark$ m

(4)

Question 3

$$\binom{50}{7} (0.15)^7 (0.85)^{43} + \binom{50}{8} (0.15)^8 (0.85)^{42} + \binom{50}{9} (0.15)^9 (0.85)^{41}$$

$$= 0.1574527 + 0.1493485 + 0.12299296$$

$$= \underline{0.4298}$$

Question 4

$$4.1) 38 \times 0,75 = 28,5 \approx 29 \quad (2)$$

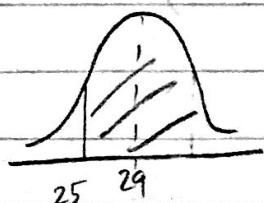
$$4.1.2) \sigma^2 = npq = np(1-p) \checkmark$$

$$= 38(0,75)(0,25) \checkmark$$

$$= 7,125 \quad \checkmark$$

$$\sigma = 2,67 \quad \checkmark \quad (4)$$

$$4.2) N \sim (29; 2,67) \quad \checkmark$$



$$Z = \frac{x - \mu}{\sigma}$$

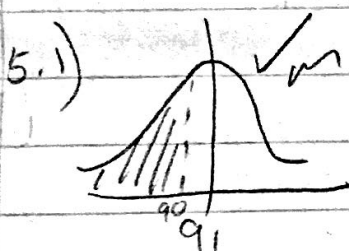
$$= \frac{25 - 29}{2,67} \checkmark$$

$$= -1,50 \quad \checkmark$$

$$P(X \geq 25) = 0,5 + 0,4332 \checkmark$$

$$= 0,9332 \checkmark \quad (7)$$

Question 5

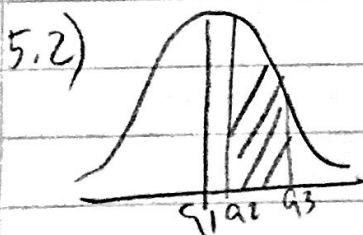


$$Z = \frac{90 - 91}{0,8}$$

$$= -1,25 \quad \checkmark$$

$$P(X < 90) = 0,5 - 0,3944 \checkmark$$

$$= 0,1056 \quad \checkmark \quad (5)$$



$$Z_1 = \frac{91 - 92}{0,8}$$

$$= -1,25 \quad \checkmark$$

$$Z_2 = 1,25 \quad \checkmark$$

$$P(91 < X < 93) = 0,49379 - 0,3944 \checkmark$$

$$= 0,0994 \quad \checkmark \quad (5)$$

5.2)



$$P(X < 150) = 1\% \quad \checkmark$$

$$P(150 < X < 153) = 0.49 \quad \checkmark$$

$$\text{but } z = -2.33 \quad \checkmark$$

$$-2.33 = \frac{150 - 153}{\sigma} \quad \checkmark$$

$$-2.33\sigma = -3$$

$$\sigma = 1.2876 \quad \checkmark$$

(5)

Question 6

6) Yes as the sample size is big enough (2)

$$6.2) \quad \hat{p} - z \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} < p < \hat{p} + z \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$0.343 - 1.96 \sqrt{\frac{0.343 \times 0.657}{350}} < p < 0.343 + 1.96 \sqrt{\frac{0.343 \times 0.657}{350}}$$

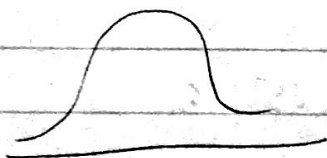
$$0.2933 < p < 0.3927 \quad \checkmark$$

We are 95% confident that the true proportion for specimens infected by IBOLA will be somewhere between 29.33% and 39.27% of the entire population

(7)

$$\text{or } \text{Var} = 350 \times \frac{120}{350} \times \frac{230}{350}$$

$$\sigma = 8.88$$



$$-1.96 = \frac{x - 120}{8.88}$$

$$x = 102.5952$$

$$-1.96 = \frac{x - 120}{8.88}$$

$$x = 137.4048$$

95% conf that between 102.59 and 137.40 people would be affected in this population

Question 7

$$7.1) \int_0^4 q(4-x) dx \sqrt{a} = 1 \sqrt{a}$$

$$q \int_0^4 4-x dx = 1 \sqrt{a}$$

$$\sqrt{a} 8q = 1$$

$$q = \frac{1}{8}$$

(4)

$$7.2) \int_1^2 \frac{1}{8} (4-x) dx \sqrt{a}$$

$$= \frac{5}{16}$$

$$= 0.3125 \sqrt{a}$$

(3)

$$7.3) 0.5 = \int_0^x \frac{1}{8} (4-x) dx \sqrt{a}$$

$$4 = \int_0^x 4-x dx$$

$$4 = 4x - \frac{x^2}{2} \Big|_0^x \sqrt{a}$$

$$4 = 4x - \frac{x^2}{2}$$

$$x^2 - 8x + 8 = 0 \sqrt{a}$$

$$x = \frac{8 \pm \sqrt{64 - 32}}{2} \sqrt{a}$$

$$x = 1.1716 \sqrt{a}$$

$$\neq 6.8284$$

(6)

Question 8

8.1) $r = 0.9392$ ✓✓
strong, positive ✓✓

(4)

8.2) $b = 26.4178$ ✓✓
 $a = -347.6086$ ✓✓

$y = 26.4178x - 347.6086$ ✓✓ (5)

8.3) $x = 20$
 $y = 180.7474$ ✓✓
 $= 181$ sold ✓✓

reliable ✓✓ as it is an interpolation ✓✓ (4)