

Q1

X - old Y - new

ci diff in ~~var~~ : 1.11, 2.57" ratio of σ^2 : 0.77, 2.83.

↑

↙

Q2

Don't reject : Type 2

Q3.

 $\mu = 3650$ $\sigma = 120$ $X \sim N(3680, 120)$ $n = 49$ $\bar{x} = 3680$ $H_0: \bar{x} > 3650$

to find

 $1 - P(H_0)$ p-value

$$Z = \frac{3680 - 3650}{\frac{120}{\sqrt{49}}}$$

$$= \frac{1}{28}$$

$$\alpha = 1.80$$

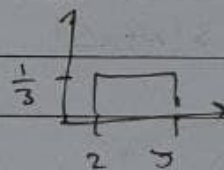
$$P(Z > 1.8) = 0.03593$$

Q4.

$$0.2 \quad E(X) = \frac{k}{p} = \frac{1}{0.2} = 5$$

Q5.

$$f_X(x) = \frac{1}{3}, \quad 2 \leq x \leq 5$$



$$V(X) = \frac{1}{12} (3)^2$$

$$= \frac{9}{12} = 0.75$$

Q6.

-

Q7?

A: $\mu = 20.6, \sigma = 0.6$ $\sim N$

Q18?

B: unknown.

 $\sim N$ sample: $\bar{x} = 21.0, s = 1.39$ $H_0: \mu = \mu_0$

$$CI: P(\bar{x} - z_{\alpha/2} \left(\frac{\sigma}{\sqrt{n}} \right) < \bar{x} < \bar{x} + z_{\alpha/2} \left(\frac{\sigma}{\sqrt{n}} \right))$$

Q18)

$$\frac{(n-1)s^2}{\chi^2_{n-1; \alpha/2}} < \sigma^2 < \frac{(n-1)s^2}{\chi^2_{n-1; 1-\alpha/2}}$$

$$\frac{8(1.39)^2}{17.5345} < \sigma^2 < \frac{8(1.39)^2}{2.1797}$$

$$= 0.8815 < \sigma^2 < 7.09125$$

Q8

$$P(A|H) = 0.4, \quad P(A|H^c) = 0.25$$

$$P(O) = 0.25$$

$$P(F) = 0.4$$

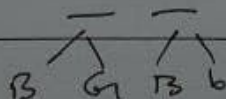
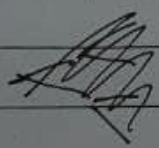
$$P(O \cap F) = 0.14$$

$$P(F|O) = \frac{P(F \cap O)}{P(O)} = \frac{0.14}{0.25} = 0.56$$

Q9.

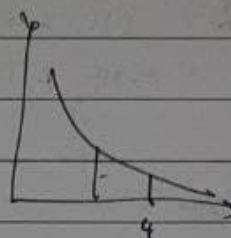
$$10C_7 \times 7! = 604800$$

Q10

~~P(B|G)~~

B, BG, GB, GG

Q11 $E(X) = 3 \quad X \sim \text{Exp}(\frac{1}{3})$
 $P(X > 3) > P(X > 4)$



Q12

$n = 14 \quad n = 14$

$\mu = 2800$

$\mu = 3000$

$\sigma^2 = 7870092$

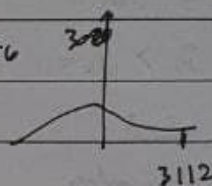
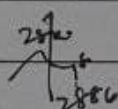
$\sigma^2 = 9049959$

$\sigma^2 = 30092$

$\sigma^2 = 49959$

$\sigma = 173.47$

$\sigma = 223.52$



$X \sim N(2800, 173.47^2) \quad Y \sim N(3000, 223.52^2)$

critical region $Z_{0.01} = 2.33$

Q14



~~$2! \times 3! \times 5! = 1440$~~

$= \frac{3!}{1!1!1!}$

$= 3! \times 4 \times 5!$

Q15



Q16 $P(A|B) = 0.8, \quad P(B) = 0.6, \quad P(A) = 0.7$

$P(A \cap B) = P(B) \cdot P(A|B) = 0.6(0.8) = 0.48$

Q17

$[XY] \quad 11 \quad 12 \quad 21 \quad 22$

$x^2 + y^2 \quad 2 \quad 5 \quad 5 \quad 8$

$P \quad 0.24 \quad 0.28 \quad 0.26 \quad 0.22$

$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$

$Z = 4.94$

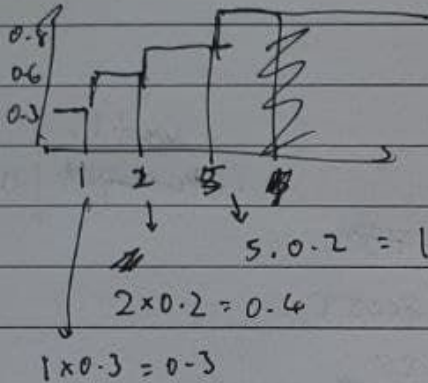
Q18. See Q7

Q26

$$V(X) = \frac{2}{3} (2.87)^2$$

$$= E(X^2) - [E(X)]^2$$

$$0.5 \quad 6.1$$



$$\left. \begin{array}{l} 25 \cdot 0.2 = 5 \\ 4 \times 0.2 = 0.8 \\ 0.3 \end{array} \right\} 6.1$$

$$E(X) = 1.7$$

Q27

0.6 / 0.7
H T H T

$$P(X=1) = P(HT) + P(TH)$$

$$= 0.6(0.3) + 0.7(0.4) = 0.46$$

$$P(A') = 0.7$$

$$P(A) = 0.3, P(B|A) = 0.75, P(A \cap B) = 0.225, P(A' \cap B) = 0.14$$

$$P(B|A') = 0.2, P(C|A \cap B) = 0.2, P(C \cap A \cap B) = 0.045$$

$$P(C|A' \cap B) = 0.15, P(C|A \cap B') = 0.8, P(C \cap A' \cap B) = 0.021$$

$$P(C|A' \cap B') = 0.9$$

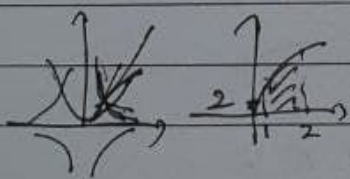
$$P(C \cap B) = 0.066$$

$$\text{and } P(B' \cap C)$$

$$= 1 - 0.066 = 0.934$$

Q30

Q31



$$\int_1^2 2 - \frac{2x}{2} dx = 1$$

$$\left[2x - \frac{1}{2} x^2 \right]_1^2 = 1$$

$$(4 - 1) - (2 - 0.5) = 1$$

Q32

$$\text{Accept} \quad 0.6 \quad 0.15$$

$$0.4 \quad 0.05$$

$$T: 0.5 \quad 0.15$$

$$P: \frac{1}{3}$$

Q33

Q19.
$$\frac{\text{No. of ways}}{\text{Total no.}} = \frac{(6C_3 \cdot 6 \cdot 3!) (3C_3 \cdot 5 \cdot 3!)}{6^6} = \frac{25}{54} = 0.46296$$

Q20

Q21

See Q12 Intra.

$$A = (\bar{x} - \bar{y})$$

$$P(\text{reject } H_0 | H_0)$$

$$V(X - Y) = V(X) + V(Y) + 2 \text{Cov}(X, Y)$$

$$30092 + 49959 = 80051$$

$$\therefore \sigma = \sqrt{80051} = 282.93285$$

Q22

 H_0 $n=10$ $\lambda=10$

$$X \sim N(93, 12.194)$$

$$Y \sim N(110.7, 8.5264)$$

$$(X - Y) \sim N(-17.7, 2\sqrt{11})$$

$$Z = \frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}}$$

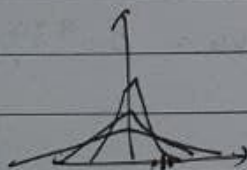
 $\mu_0 = 0$

$$Z = \frac{-17.7}{2\sqrt{11}/\sqrt{10}} = -8.438$$

$$P(Z < -8.438)$$

$$x_1 = -Z_{\alpha/2} \frac{\sigma}{\sqrt{n}} = 0.4013$$

Q23



35					
5	6	8	8	6	6
1, 2	2, 1	3	4	5	6
1, 3	2, 2				
1, 4	2, 3				
1, 5	2, 4				
1, 6	2, 5				
	2, 6				

Q24

Q25

$$\text{sum} = 8 \rightarrow \left. \begin{array}{l} 2, 6 \\ 6, 2 \\ 3, 5 \\ 5, 3 \\ 4, 4 \end{array} \right\} 5$$

$$\text{Ans} = \frac{5}{35} = 0.143$$

Q26