

Q1

$n = [3, 2, 5, 4, 7, 2, 3, 3, 1, 6, 4, 2, 3, 5, 2, 4, 2, 1, 3, 5, 6, 3, 2, 1, 4, 2, 4, 5, 3, 2, 7, 2, 3, 4, 5, 1, 6, 2, 4, 3, 5, 3, 2, 4, 2, 6, 3, 2, 4, 5]$

$$\bar{x} = \frac{\sum x_i}{n}$$

$$= \frac{181}{50} = 3.62$$

$M = 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5, 5, 5, 6, 6, 7$

$$= \left(\frac{n+1}{2} \right)^{th} \text{ term}$$

$$= \frac{3+3}{2} = 3$$

Mode = 2 - Most frequent Value

Q2 ① Range = Maximum - Minimum
 $= 7 - 1$
 $= 6$

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

$\sum (x_i - \bar{x})^2 = 65.24$

$s^2 = \frac{65.24}{50-1} = \frac{65.24}{49} = 1.33$

③ $s = \sqrt{s^2}$

$= \sqrt{1.33} = 1.15$

3 $n = 120, 150, 110, 135, 125, 140, 130,$
 $155, 115, 145, 135, 130$

① $\bar{x} = \frac{\sum x_i}{n} = \frac{1590}{12} = 132.5$

② Range = $155 - 110$
 $= 45$

Date _____
Page _____

$$\text{Model A} = 30, 32, 33, 28, 31, 30, 29, 30, 32, 31$$

$$\bar{x} = \frac{30 + 32 + 33 + 28 + 31 + 30 + 29 + 30 + 32 + 31}{10}$$

$$= 30.6$$

$$\begin{aligned} \text{Range} &= \text{Max} - \text{Min} \\ &= 33 - 28 \\ &= 5 \end{aligned}$$

$$\text{Variance } (s^2) = \frac{\sum (x_i - \bar{x})^2}{n-1}$$

$$\begin{aligned} \sum (x_i - \bar{x})^2 &= 0.36 + 1.96 + 5.76 + 0.16 + 0.36 + 2.56 + 0.36 + 0.16 \\ &= 20.4 \end{aligned}$$

$$\frac{\sum (x_i - \bar{x})^2}{n-1} = \frac{20.4}{9}$$

Model B

$$\bar{x} = \frac{25 + 27 + 26 + 23 + 28 + 24 + 26 + 25 + 28}{10}$$

$$\boxed{\bar{x} = 25.9}$$

$$\text{Range} = \text{Max} - \text{Min}$$

$$= 28 - 23$$
$$\boxed{= 5}$$

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

$$= 2.32$$

Model C = 22, 23, 20, 25, 21, 24, 23, 25, 24

$$\bar{x} = \frac{22 + 23 + 20 + 25 + 21 + 24 + 23 + 25 + 24}{10}$$

$$\boxed{\bar{x} = 22.9}$$

Date: / /
Page:

$$\text{Range} = \text{Max} - \text{Min}$$

$$= 25 - 20$$

$$= 5$$

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

$$s^2 = 3.21$$

Model D = 18, 17, 19, 20, 21, 18, 19, 17, 20, 18

$$\bar{x} = \frac{\sum x_i}{n} = 18.8$$

$$\text{Range} = \text{Max} - \text{Min}$$

$$= 21 - 17$$

$$= 4$$

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

$$s^2 = 1.56$$

Model E = 35, 36, 34, 35, 33, 34, 32,
33, 36, 34.

$$\bar{x} = \frac{\sum x_i}{n} = \boxed{24.2}$$

$$\text{Range} = \text{Max} - \text{Min} \\ = 36 - 32 \\ = \boxed{4}$$

$$s^2 = \frac{\sum (x_i - \bar{x})^2}{n-1} \\ = \boxed{11.38}$$

$$n-1 = 10-1 = 9$$

Q10

$$\begin{aligned}n &= 100 \\ \bar{x} &= 170 \text{ cm} \\ S &= 8 \text{ cm} \\ CL &= 95\%\end{aligned}$$

$$\begin{aligned}1 - 0.05 \\ 0.05\end{aligned}$$

$$\text{Degree of freedom} = n - 1 = 100 - 1 = 99$$

$$T\text{-value} = 1.98$$

$$SE = \frac{S}{\sqrt{n}} = \frac{8}{\sqrt{100}} = \frac{8}{10} = 0.8$$

$$\begin{aligned}\text{Multiple } t\text{-value} \times SE \\ &= 1.98 \times 0.8 \\ &= 1.584\end{aligned}$$

$$\begin{aligned}CI &= \bar{x} \pm t \cdot SE \\ &= 170 \pm 1.584 \\ &= (168.416, 171.584)\end{aligned}$$

$$NS = 1 - 2\alpha = 1 - 0.10 = 0.90$$

Q15

$$P(X=x) = \frac{e^{-\lambda} \cdot \lambda^x}{x!}$$

$$\lambda = 2$$

$$x = 3$$

$$e = 2.718$$

$$P(X=3) = \frac{e^{-2} \cdot 2^3}{3!}$$

$$= \frac{0.1353 \times 2^4}{3 \times 2}$$

$$= 0.1804$$

Q9

omical

$n = 10$ at least 8 questions.

$$k = 4$$

$$P(X=8) = \binom{10}{8} \left(\frac{1}{4}\right)^8 \left(\frac{3}{4}\right)^{10-8}$$

$$= \frac{10!}{8!2!} \times 1.52 \times 0.5625$$

$$= \frac{10 \times 9 \times 8!}{8! \times 2 \times 1} \times 1.52 \times 0.5625$$

$$P(X=9) = \binom{10}{9} (0.25)^9 (0.75)^1$$

$$= 10 \times (0.25)^9 \times (0.75)^1$$

$$P(X=10) = \binom{10}{10} (0.25)^{10} \times (0.75)^0$$

$$= 1 \times (0.25)^{10}$$

$$(0.25)^8 \approx 1.52 \times 10^{-5}$$

$$(0.25)^9 \approx 3.814 \times 10^{-6}$$

$$(0.25)^{10} \approx 9.53 \times 10^{-7}$$

$$(0.75)^2 = 0.56$$

$$(0.75)^1 = 0.75$$

$$P(X \geq 7) = 0.000386 + 0.0000286 + 0.0000009537$$

$$\boxed{\approx 0.0004156}$$

Q14

$$n = 500$$

$$x = 320$$

$$\text{Sample proportion } \hat{p} = \frac{x}{n}$$

$$= \frac{320}{500} = 0.64$$

$$CL = 90\%$$

$$z^* = 1.645$$

$$SE = \sqrt{\frac{0.64 \times (1 - 0.64)}{500}}$$

$$= \sqrt{\frac{0.2304}{500}} = \sqrt{0.0004608}$$

$$\approx 0.0215$$

$$z \times SE = 1.645 \times 0.0215$$

$$\approx 0.0354$$

$$CI = 0 + 0.64 \pm 0.0354$$

$$= (0.6046, 0.6754)$$