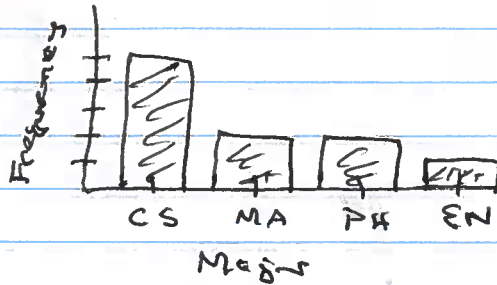


03-04 Single Variable Descriptive Statistics

By Hand EXAM Qs

- Major: MA, CS, PH, MA, EN, CS, CS, CS, CS, PH

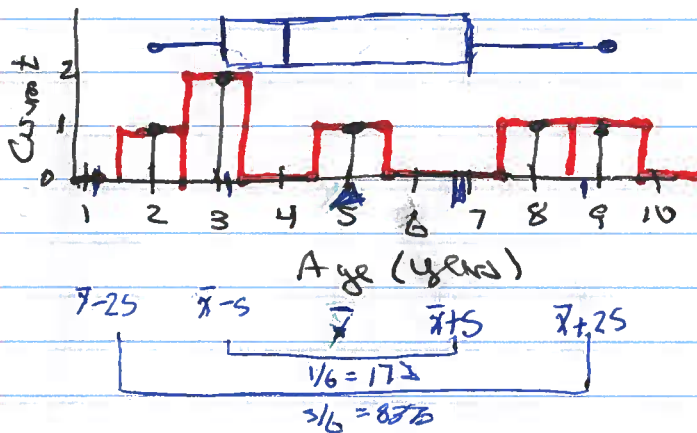
MA II
CS III
PH II
EN I



$$\hat{P}_{MA} = \frac{2}{10} = 0.2$$

$$= 20\%$$

- Age (years): 2, 3, 3, 5, 8, 9



$$\tilde{x} = \frac{3+5}{2} = 4 \text{ years}$$

$$\bar{x} = \frac{2+3+3+5+8+9}{6} = 5 \text{ yr}$$

$$MR = \frac{2+9}{2} = 5.5 \text{ years}$$

$$V = \frac{(2-5)^2 + \dots + (9-5)^2}{6-1}$$

$$= 8.4 \text{ years}^2$$

$$S = \sqrt{8.4} = 2.9 \text{ years}$$

$$AD = \frac{1}{6} (|2-4| + \dots + |9-4|)$$

$$= 7/3 \approx 2.3 \text{ years}$$

$$\text{Range} = 9 - 2 = 7 \text{ years}$$

$$(6-1)(0.25) = 1.25$$

$$q_{0.25} = (0.75)(3) + (0.25)(3)$$

$$= 3 \text{ years}$$

$$(6-1)(0.75) = 3.75$$

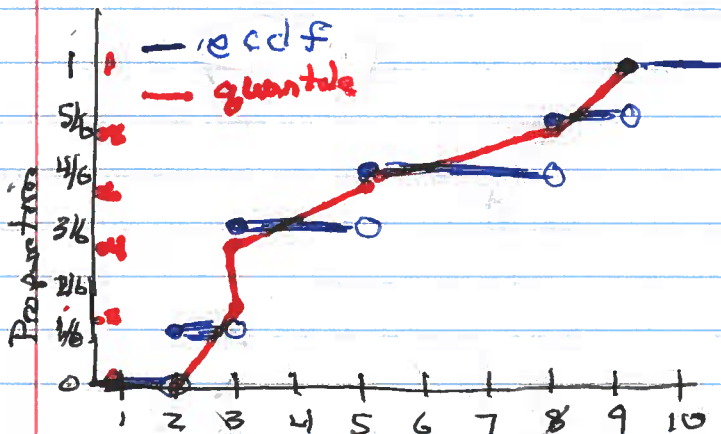
$$q_{0.75} = (0.25)(5) + (0.75)(8)$$

$$= 7.25 \text{ years}$$

$$IQR = 7.25 - 3 = 4.25 \text{ yr}$$

$$50\% \text{ Coverage interval} =$$

$$[3, 7.25] \text{ years}$$



Measure of Centre as Models

$$\min f(x) = \sum_{i=1}^n (x_i - x)^2$$

$$f'(x) = \sum_{i=1}^n 2(x_i - x)(-1)$$

$$f'(x) = 0 \text{ iff } \sum_{i=1}^n (x_i - x) = 0$$

$$\text{iff } x = \frac{1}{n} \sum_{i=1}^n x_i$$

$$f''(x) = \sum_{i=1}^n (2)(-1)(-1) = 2n > 0$$

Hence, a minimum has been found

$$\min f(x) = \max \{ |x - x_i| : i = 1, 2, \dots, n \}$$

$$= \begin{cases} x_n - x & \text{if } x < x_1 \\ \max \{ x - x_1, x_n - x \} & \text{if } x_1 \leq x \leq x_n \\ x - x_1 & \text{if } x_n < x \end{cases}$$

This is minimized when $x - x_1 = x_n - x \Rightarrow x = \frac{1}{2}(x_1 + x_n)$.

Lies, Daimin Lies, and Statistika,

Key observation: median $<$ mean