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1 | Calculations

1.1 Mean

$$\overline{income} = \frac{450 + 550 + 300 + 650 + 100 + 900 + 200 + 250 + 300 + 600}{10} = 430$$

$$\overline{age} = \frac{21 + 23 + 27 + 30 + 20 + 18 + 20 + 22 + 21 + 21}{10} = 22.3$$

1.2 Mode

- Income: 300
- Age: 21

1.3 Median

Income:

$$\frac{300 + 450}{2} = 375$$

Age:

$$\frac{21 + 21}{2} = 21$$

1.4 Range

Income:

$$900 - 100 = 800$$

Age:

$$30 - 18 = 12$$

1.5 Standard Deviation

$$s_{income} = \sqrt{\frac{\sum(y_i - \bar{y})^2}{n - 1}} = \sqrt{\frac{(450 - 430)^2 + (550 - 430)^2 + (300 - 430)^2 + (600 - 430)^2}{10 - 1}} = 245.18$$

$$s_{age} = \sqrt{\frac{\sum(y_i - \bar{y})^2}{n - 1}} = \sqrt{\frac{(21 - 22.3)^2 + (23 - 22.3)^2 + (27 - 22.3)^2 + (21 - 22.3)^2}{10 - 1}} = 3.59$$

1.6 Variance

$$s_{income}^2 = 60111.11$$

$$s_{age}^2 = 12.9$$

1.7 70th percentile

Calculate the position (P):

$$P = (n + 1) \times \frac{70}{100} = (10 + 1) \times 0.7 = 11 \times 0.7 = 7.7$$

This means the 70th percentile lies at 0.7 of the way between the 7th and 8th values in the sorted data.

70th percentile for Income

Sorted income values:

100, 200, 250, 300, 300, 450, 550, 600, 650, 900

- 7th value: 550
- 8th value: 600

Interpolate:

$$70^{\text{th}}\text{percentile income} = 550 + 0.7 \times (600 - 550) = 550 + 0.7 \times 50 = 550 + 35 = 585$$

70th percentile for Age

Sorted age values:

18, 20, 20, 21, 21, 21, 22, 23, 27, 30

- 7th value: 22
- 8th value: 23

Interpolate:

$$70^{\text{th}}\text{percentile age} = 22 + 0.7 \times (23 - 22) = 22 + 0.7 \times 1 = 22 + 0.7 = 22.7$$