Chapter 4: measures of dispersion (variance and st.d)

1) Variance (S^2)

$$S^2 = \frac{\sum(X_i - \bar{X})^2}{N-1}$$

2) St.d.: Standard deviation (S)

$$S = \sqrt{\frac{\sum(X_i - \bar{X})^2}{N-1}}$$

3) Example

For the follow raw data, please compute S^2 and S

34, 12, 56, 79, 109, 27, 19, 17, 56, 65, 47, 23, and 34

$$\bar{X} = \frac{\sum X_i}{N} = \frac{34+12+56+79+109+27+19+17+56+65+47+23+34}{13} = 44.5$$

$$S^2 = \frac{(34-44.5)^2 + (12-44.5)^2 + (56-44.5)^2 + (79-44.5)^2 + (109-44.5)^2 + (27-44.5)^2 + (19-44.5)^2 + (17-44.5)^2 + (56-44.5)^2 + (65-44.5)^2 + (47-44.5)^2 + (23-44.5)^2 + (34-44.5)^2}{(13-1)}$$

$$S^2 = 791.1$$

$$S = \sqrt{\frac{\sum(X_i - \bar{X})^2}{N-1}} => S = \sqrt{791.1} = 28.1$$

4) Exercise

For the follow raw data, please compute S^2 and S

134, 212, 0, 79, 10, 217, 190, 17, 56, 65, 47, and 203

$\bar{X} = \frac{\sum X_i}{N} = 102.5$

$S^2 = 7{,}038.5$

$S = \sqrt{\frac{\sum (X_i - \bar{X})^2}{N-1}} => S = \sqrt{7038.5} = 83.9$

5) When to use which

	nominal	ordinal	Interval/ratio
IQV	Yes	Yes	Yes
Variance	No	No	Yes
St.d.	No	No	Yes