

Chapter 4 Measures of dispersions in frequency table

1) Variance and st.d

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

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

2) Example

age	frequency	Cumulative frequency
3	36	
12	28	
19	7	
28	96	
35	21	
44	189	
58	200	
N	577	

$$\bar{X} = \frac{\sum X_i f_i}{N} = \frac{3 \times 36 + 12 \times 28 + 19 \times 7 + 28 \times 96 + 35 \times 21 + 44 \times 189 + 58 \times 200}{577} = 41.4$$

$$S^2 = \frac{(3 - 41.4)^2 \times 36 + (12 - 41.4)^2 \times 28 + (19 - 41.4)^2 \times 7 + (28 - 41.4)^2 \times 96 + (35 - 41.4)^2 \times 21 + (44 - 41.4)^2 \times 189 + (58 - 41.4)^2 \times 200}{576} = 269.59$$

$$S = \sqrt{\frac{\sum(X_i - \bar{X})^2 \times F_i}{N - 1}} = \sqrt{S^2} = 16.41$$

3) Exercises

For the following frequency table, please compute its Variance (S^2) and st.d. (S)

age	frequency
0	197
3	36
12	28
19	7
28	96
35	21
44	19
58	100
N	

$$\bar{X} = \frac{\sum X_i f_i}{N} = 21.1$$

$$S^2 = \frac{\sum (X_i - \bar{X})^2 \times F_i}{N - 1} = 510.14$$

$$S = \sqrt{\frac{\sum (X_i - \bar{X})^2 \times F_i}{N - 1}} = 22.59$$