

Problem Set 1 – Answer Key

1.

mean: $\hat{\mu}_x = (200+250+100+300+300)/5=230$ (million)

Median : 250 million

Mode : {300,300} (in millions)

Variance:

$$\hat{\sigma}_x^2 = 1/4 \sum_1^5 (x_i - \overline{\mu}_x)^2 = 1/4 * [(200 - 230)^2 + (250 - 230)^2 + (100 - 230)^2 + (300 - 230)^2 + (300 - 230)^2]$$

=7000 (million*million)

Standard Deviation: $\hat{\sigma}_x = \sqrt{7000} = 83.666$ (million)

Range: 300-100=200

2.

Mean=1/5*(1+3+1+4+5)=2.8

$$\hat{\sigma}_y = \{1/4 \sum_1^5 (y_i - \overline{\mu}_x)^2\}^{1/2} = \{1/4 * [(1-2.8)^2 + (3-2.8)^2 + (1-2.8)^2 + (4-2.8)^2 + (5-2.8)^2]\}^{1/2} = 1.789$$

Covariance=1/4[(1-2.8)(200-230)+(3-2.8)*(250-230)+(1-2.8)*(100-230)+(4-2.8)*(300-230)+(5-2.8)*(300-230)] =1/4(54+4+234+84+154) =132.5

Correlation=Covariance/(st.d(x)*st.d(y)) =0.885

3.

mean: $\hat{\mu}_x = 230000$

$$\hat{\sigma}_x^2 = 7e+09$$

Standard Deviation: $\hat{\sigma}_x = 83666$

Covariance=132,500

Correlation=Covariance/(st.d(x)*st.d(y))=132,500/(83,666*1.789)=0.885

The covariance changes as a result of the change in units, while the correlation remains the same.