Math323

Homework 4

November 23, 2021

Problem 3

Show that

Proof:

$$\frac{1}{N}\sum_{i=0}^{N-1}(x_i - m_x)(y_i - m_y) = \tag{1}$$

$$\frac{1}{N}\sum_{i=0}^{N-1} x_i y_i - x_i m_y - y_i m_x + m_x my = \tag{2}$$

$$\frac{1}{N}\sum_{i=0}^{N-1} x_i y_i - \frac{1}{N}\sum_{i=0}^{N-1} x_i m_y - \frac{1}{N}\sum_{i=0}^{N-1} y_i m_x + \frac{1}{N}\sum_{i=0}^{N-1} m_x m_y = \tag{3}$$

$$\frac{1}{N}\sum_{i=0}^{N-1} x_i y_i - \frac{m_y}{N}\sum_{i=0}^{N-1} x_i - \frac{m_x}{N}\sum_{i=0}^{N-1} y_i + \frac{1}{N}\sum_{i=0}^{N-1} m_x m_y = \tag{4}$$

$$\overline{xy} - m_y\bar{x} - m_x\bar{y} + \bar{x}\bar{y} = \tag{5}$$

$$\overline{xy} - \bar{x}\bar{y} - \bar{x}\bar{y} + \bar{x}\bar{y} = \tag{6}$$

$$\overline{xy} - \bar{x}\bar{y} \tag{7}$$