

פתרון תרגיל 3

פתרון לשאלה 1
I

$$1. X'X = \begin{pmatrix} n & \sum X \\ \sum X & \sum X^2 \end{pmatrix} = \begin{pmatrix} 5 & 50 \\ 50 & 600 \end{pmatrix}$$

$$2. X'Y = \begin{pmatrix} \sum Y \\ \sum XY \end{pmatrix} = \begin{pmatrix} 60 \\ 680 \end{pmatrix}$$

$$3. Y'Y = \sum Y^2 = 800$$

$$4. (X'X)^{-1} = \begin{pmatrix} 1.2 & -0.1 \\ -0.1 & 0.01 \end{pmatrix}$$

$$5. \bar{X} = \begin{pmatrix} n & \sum X \end{pmatrix} = \begin{pmatrix} 5 & 50 \end{pmatrix}$$

$$6. (X'X)^{-1}X'Y = \begin{pmatrix} 4 \\ 0.8 \end{pmatrix}$$

$$7. r(X) = 2$$

$$8. r(X'X) = 2$$

II

1. 600

2. 680

3. 800

4. $\frac{1}{600}$

5. 50

6. $\frac{680}{600}$

7. 1

8. 1

2: כיוון

$$V(u) = \begin{pmatrix} E(u_1 - E(u_1))^2 & E(u_1 - E(u_1))(u_2 - E(u_2)) & \dots \\ E(u_2 - E(u_2))(u_1 - E(u_1)) & E(u_2 - E(u_2))^2 & \dots \\ \vdots & \vdots & \ddots \end{pmatrix} \quad 1$$

$$= \begin{pmatrix} V(u_1) & \text{cov}(u_1, u_2) & \dots \\ \text{cov}(u_2, u_1) & V(u_2) & \dots \\ \vdots & \vdots & \ddots \end{pmatrix}$$

3: כיוון - קוארדונט - הסימטרי - הסימטרי

$$V(u) = \begin{pmatrix} \sigma^2 & \text{cov}(u_1, u_2) & \dots \\ \text{cov}(u_2, u_1) & \sigma^2 & \dots \\ \vdots & \vdots & \ddots \end{pmatrix} \quad 2$$

$$V(u) = \begin{pmatrix} \sigma^2 & 0 & 0 & \dots \\ 0 & \sigma^2 & 0 & \dots \\ \vdots & \vdots & \vdots & \ddots \end{pmatrix} \quad 3$$

$$a' = (4 \quad 2 \quad -6)$$

$$V(a'u) = (4 \quad 2 \quad -6) \begin{pmatrix} \sigma^2 & 0 & 0 \\ 0 & \sigma^2 & 0 \\ 0 & 0 & \sigma^2 \end{pmatrix} \begin{pmatrix} 4 \\ 2 \\ -6 \end{pmatrix} =$$

$$= 4^2 \sigma^2 + 2^2 \sigma^2 + (-6)^2 \sigma^2 = 56 \sigma^2$$