1) consider

\[ A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 0 \end{bmatrix}, \quad \text{and } C = \begin{bmatrix} 2 & 1 \\ 0 & 1 \end{bmatrix} \]

compute \(ABC, \ CAB, \ BCA, \ CB'A', \ \text{and } C'B'A'\)

2) Show whether or not \(A = X(X'X)^{-1}X'\) is idempotent

3) Determine whether the quadratic form \(Q = x_1^2 + 2x_2^2 + x_3^2 - 2x_1x_2 + 2x_2x_3\) is positive definite or not

[Hint: rewrite in matrix notation and then check the coefficient matrix]

4) show that the simple regression line of \(y\) against \(x\) coincides with the simple regression line of \(x\) against \(y\) if and only if \(r^2 = 1\) (where \(r\) is the sample correlation coefficient between \(x\) and \(y\)).

Wooldridge pp. 60-61: #1, 6

Wooldridge p. 64: #C2, C3