

First Semester
(without calculators)
Sunday 6-4-1447

First Quiz
Time: 20 mins.
240 Math

King Saud University
College of Science
Math. Department

Name:

ID no.:

Q1: If $A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix}$ and $B = [1 \ 1 \ 1]$, then find the following:

(a) $\text{tr}(A^{-1})$ (2 marks).

(b) $B^T B$ (1 mark).

(c) $(A^T)^5$ (2 marks).

Solution

Q1:

(a)

$$A^{-1} = \begin{bmatrix} \frac{1}{2} & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & \frac{1}{2} \end{bmatrix} \Rightarrow \text{tr}(A^{-1}) = \frac{1}{2} + 1 + \frac{1}{2} = 2$$

(b)

$$B^T B = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} [1 \ 1 \ 1] = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$$

(c)

$$A^T = A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix} \Rightarrow (A^T)^5 = \begin{bmatrix} 32 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 32 \end{bmatrix}$$