

Please show **all** your work! Answers without supporting work will not be given credit.

Clearly mention what theorem(s), if any, you are using.

Write answers in spaces provided.

You have 15 minutes to complete this Quiz.

You can get MAXIMUM $(10 + (3 + 3 + 4)) = 20$ marks.

Name:

1. Find the least-squares solution \vec{x}^* to the system

$$A\vec{x} = b \text{ where } A = \begin{bmatrix} 1 & 1 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} \text{ and } \vec{b} = \begin{bmatrix} 3 \\ 3 \\ 3 \end{bmatrix}$$

2. Let U_n be the space of Upper triangular $n \times n$ matrices.

- (a) What is the dimension of U_n ?
- (b) Find a basis of U_2 (i.e. when $n = 2$).
- (c) Let $T : U_2 \rightarrow U_2$ be a linear transformation defined as

$$T(M) = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix} M$$

Find the determinant of T .