

## Quiz 3

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

**Question 1.** §1.3 Consider the matrices

$$A = \begin{bmatrix} 3 & 0 \\ -1 & 2 \\ 1 & 1 \end{bmatrix}, B = \begin{bmatrix} 4 & -1 \\ 0 & 2 \end{bmatrix}, C = \begin{bmatrix} 1 & 4 & 2 \\ 3 & 1 & 5 \end{bmatrix}, D = \begin{bmatrix} 1 & 5 & 2 \\ -1 & 0 & 1 \\ 3 & 2 & 4 \end{bmatrix}, E = \begin{bmatrix} 6 & 1 & 3 \\ -1 & 1 & 2 \\ 4 & 1 & 3 \end{bmatrix}$$

In each part, compute the given expression (where possible).

#51. (3 marks)  $\text{tr}((EC^T)^T A)$

**Question 2.** §1.3 #21 (2 marks) Prove: If  $A$  and  $B$  are  $n \times n$  matrices, then  $\text{tr}(A + B) = \text{tr}(A) + \text{tr}(B)$

**Question 3.** §1.3 #29 A matrix  $B$  is said to be a *square root* of a matrix  $A$  if  $BB = A$ .

a. (2 marks) Find two square roots of  $A = \begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$ .

b. (3 marks) How many different square roots can you find of  $A = \begin{bmatrix} 5 & 0 \\ 0 & 9 \end{bmatrix}$