

## Quiz 4

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 mark) Find a nonzero  $3 \times 3$  matrix  $A$  such that  $A^t = -A$ .

$$A = \begin{bmatrix} 0 & 1 & 2 \\ -1 & 0 & 3 \\ -2 & -3 & 0 \end{bmatrix}$$

Question 2. (2 marks) Find  $A^{-1}$  if a square matrix satisfies  $A^2 + 3A + I = 0$

notice:  $I = -A^2 - 3A$  and  $I = (-A - 3I)A$   
 $I = A(-A - 3I)$   
 $\therefore A^{-1} = -A - 3I$

Question 3. (7 marks) Solve for the matrix  $A$ :

$$(2I + 3A^{-1})^t = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$$

$$((2I + 3A^{-1})^t)^t = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}^t$$

$$2I + 3A^{-1} = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$$

$$3A^{-1} = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix} - 2 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$3A^{-1} = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$$

$$A^{-1} = \begin{bmatrix} 0 & \frac{1}{3} \\ \frac{1}{3} & \frac{1}{3} \end{bmatrix}$$

$$(A^{-1})^{-1} = \begin{bmatrix} 0 & \frac{1}{3} \\ \frac{1}{3} & \frac{1}{3} \end{bmatrix}^{-1}$$

$$A = \frac{1}{0(\frac{1}{9}) - (\frac{1}{3})(\frac{1}{3})} \begin{bmatrix} \frac{1}{3} & -\frac{1}{3} \\ \frac{1}{3} & 0 \end{bmatrix}$$

$$A = \begin{bmatrix} -3 & 3 \\ 3 & 0 \end{bmatrix}$$