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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. *(5 marks)* §1.6 # 9 Solve the linear systems together by reducing the appropriate augmented matrix.

$$\begin{array}{rcl} x_1 & - & 5x_2 & = & b_1 \\ 3x_1 & + & 2x_2 & = & b_2 \end{array}$$

$(i)\ b_1 = 1, b_2 = 4 \quad (ii)\ b_1 = -2, b_2 = 5$

$$\left[\begin{array}{cc|c|c} 1 & -5 & 1 & -2 \\ 3 & 2 & 4 & 5 \end{array}\right]$$

$$\underset{-3R_1 + R_2 \to R_2}{\sim} \left[\begin{array}{cc|c|c} 1 & -5 & 1 & -2 \\ 0 & 17 & 1 & 11 \end{array}\right]$$

$$\underset{\frac{1}{17}R_2}{\sim} \left[\begin{array}{cc|c|c} 1 & -5 & 1 & -2 \\ 0 & 1 & 1/17 & 11/17 \end{array}\right]$$

$$\underset{5R_2 + R_1 \to R_1}{\sim} \left[\begin{array}{cc|c|c} 1 & 0 & 22/17 & 31/17 \\ 0 & 1 & 1/17 & 11/17 \end{array}\right]$$

$\therefore\ i)\quad (X_1, X_2) = (22/17, 1/17)$

$\quad ii)\quad (X_1, X_2) = (31/17, 11/17)$

Question 2. §1.7 # 32 Let A be an $n \times n$ symmetric matrix.

a. *(2 marks)* Show that A^2 is symmetric.

b. *(3 marks)* Show that $2A^2 - 3A + I$ is symmetric.

a) Need to show $(A^2)^t = A^2$ with the premise $A^t = A$. LHS $= (A^2)^t = (A^t)^2 = (A)^2$

$$= A^2 = RHS$$

b) Need to show $2A^2 - 3A + I$ with the premise $A^t = A$.

LHS $= (2A^2 - 3A + I)^t = (2A^2)^t + (-3A)^t + I^t$

$$= 2(A^2)^t - 3A^t + I = 2A^2 - 3A + I = RHS$$