

Computational Mathematics/Information Technology

Solutions Worksheet 3

Solution of Simultaneous Equations

1. Using the results of task 1 complete the following:

$$A^{-1} = \begin{pmatrix} -1 & -1 & 1 \\ -0.625 & -0.3125 & 0.5625 \\ 0.5 & 0.25 & -0.25 \end{pmatrix} \quad AA^{-1} = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$C^T = \begin{pmatrix} 3 & -2 & 3 \\ 4 & 1 & 8 \end{pmatrix} \quad BA = (4 \quad 24 \quad 42)$$

[2 marks]

2. Using the results of Task 2 complete the following:

$$C + D = \begin{pmatrix} 3 & 6 \\ -4 & 4 \\ 6 & 1 \end{pmatrix} \quad 2 * C = \begin{pmatrix} 6 & 10 \\ -4 & 2 \\ 6 & 16 \end{pmatrix} \quad C * D = \begin{pmatrix} 0 & 5 \\ 4 & 3 \\ 9 & -56 \end{pmatrix}$$

[2 marks]

3. The solutions to the equations in Task 3 are

$$x = 2 \quad y = -1 \quad z = 1 \quad [2 \text{ marks}]$$

4. The solutions to the equations in Task 4(c) are:

$$x = 1 \quad y = 2 \quad z = 1 \quad u = 2$$

$$v = 1 \quad w = 2 \quad [2 \text{ marks}]$$

5. For Task 5 complete:

$$J = \begin{pmatrix} f_x(x_0, y_0) & f_y(x_0, y_0) \\ g_x(x_0, y_0) & g_y(x_0, y_0) \end{pmatrix} = \begin{pmatrix} 5.1 & -1.4 \\ -2 & -1.8 \end{pmatrix}$$

For Task 5 the three sets of solutions are given by *to 5 decimal places*:

- (i) $x = 0.5$ $y = 1.0$ (*do not worry about decimal places for this one*)
(ii) $x = 0.65549$ $y = 0.46323$ (iii) $x = -0.74519$ $y = -0.38529$
[2 marks]

Marking Notes:

Allow 2 marks for a totally correct solution to a question. For any error, but otherwise a mostly correct solution, give 1 mark.