MAU11S02 Group A1 Quiz 07 9am 20/3/19 ANSWERS

Rules and procedures.
1. Answers must be handed up at the end of the tutorial, no other time. **2.** Attempt 3 questions. Only *your first three answers* will be marked. **3.** Each question carries 10 marks, so the maximum quiz mark is 30. **4.** Marked quizzes will be returned, and answers published, the following week. **5.** If a particular method of solution is stipulated, you get no marks if you don't use it. **6.** The (9) quizzes will contribute 20% to your overall mark. **7.** You are allowed to collaborate and compare answers during the tutorial. **8.** ***Show all work.*** No marks will be given for answers which do not show the calculations.

Answer 1.

$$\begin{bmatrix} 33 & 1 & 9 \\ 1 & 9 & 1 \\ 9 & 1 & 4 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 14 \\ 8 \\ 8 \end{bmatrix}$$

Answer 2.

$$a = -1/4, b = 13/20, c = 12/5$$

Answer 3.

$$\begin{vmatrix} \lambda - 7 & 4 \\ -5 & \lambda + 2 \end{vmatrix} = 0$$
$$(\lambda - 7)(\lambda + 2) + 20 = 0$$
$$\lambda^2 - 5\lambda + 6 = 0$$
$$\lambda = 3, 2$$
$$3 : \begin{bmatrix} -4 & 4 \\ -5 & 5 \end{bmatrix} : \begin{bmatrix} 1 \\ 1 \end{bmatrix} \qquad 2 : \begin{bmatrix} -5 & 4 \\ -5 & 4 \end{bmatrix} : \begin{bmatrix} 4 \\ 5 \end{bmatrix}$$

Answer 4.

$$S = \begin{bmatrix} 1 & 4 \\ 1 & 5 \end{bmatrix}$$
$$(\det(S) = 1) \qquad Se^{A't}S^{-1} =$$
$$\begin{bmatrix} 1 & 4 \\ 1 & 5 \end{bmatrix} \begin{bmatrix} e^{3t} & 0 \\ 0 & e^{2t} \end{bmatrix} \begin{bmatrix} 5 & -4 \\ -1 & 1 \end{bmatrix} =$$
$$\begin{bmatrix} e^{3t} & 4e^{2t} \\ e^{3t} & 5e^{2t} \end{bmatrix} \begin{bmatrix} 5 & -4 \\ -1 & 1 \end{bmatrix} = \begin{bmatrix} 5e^{3t} - 4e^{2t} & -4e^{3t} + 4e^{2t} \\ 5e^{3t} - 5e^{2t} & -4e^{3t} + 5e^{2t} \end{bmatrix}$$

Answer 5.

$$e^{At}\begin{bmatrix} 4 \\ -3 \end{bmatrix} =$$

$$\begin{bmatrix} 5e^{3t} - 4e^{2t} & -4e^{3t} + 4e^{2t} \\ 5e^{3t} - 5e^{2t} & -4e^{3t} + 5e^{2t} \end{bmatrix} \begin{bmatrix} 4 \\ -3 \end{bmatrix} = \begin{bmatrix} 32e^{3t} - 28e^{2t} \\ 32e^{3t} - 35e^{2t} \end{bmatrix}$$