MAU11S02 Group A2 Quiz 07 3pm 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.

$$\begin{bmatrix} 99 & -35 & 15 \\ -35 & 15 & -5 \\ 15 & -5 & 4 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} -9 \\ 5 \\ -1 \end{bmatrix}$$

Answer 2.

$$a = 3/22, b = 15/22, c = 1/11$$

Answer 3.

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

Answer 4.

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

Answer 5.

$$e^{At}\begin{bmatrix} 2 \\ -1 \end{bmatrix} =$$

$$\begin{bmatrix} 3e^t - 2e^{2t} & 2e^t - 2e^{2t} \\ -3e^t + 3e^{2t} & -2e^t + 3e^{2t} \end{bmatrix}\begin{bmatrix} 2 \\ -1 \end{bmatrix} =$$

$$\begin{bmatrix} 4e^t - 2e^{2t} \\ -4e^t + 3e^{2t} \end{bmatrix}.$$