

Mech 221 Math Suggested Problems Week #8

Brian Wetton

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1. Determine whether the following set of vector functions is linearly dependent or linearly independent for all t :

$$\begin{bmatrix} 1 \\ t \\ 0 \end{bmatrix} \quad \begin{bmatrix} 0 \\ 1 \\ t^2 \end{bmatrix} \quad \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

2. Section 4.3: # 31

3. Determine a fundamental solution to the problem $\mathbf{y}' = \mathbf{A}\mathbf{y}$ where

$$\mathbf{A} = \begin{bmatrix} 1 & 2 \\ -4 & 7 \end{bmatrix}$$

Also, determine the solution that satisfies

$$\mathbf{y}(0) = \begin{bmatrix} 7 \\ 11 \end{bmatrix}.$$

4. Determine a fundamental solution to the problem $\mathbf{y}' = \mathbf{A}\mathbf{y}$ where

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

Also, determine the solution that satisfies

$$\mathbf{y}(0) = \begin{bmatrix} 4 \\ 3 \\ -1 \end{bmatrix}.$$

5. Section 4.6: #1

6. Section 4.6: #16

7. Solve the initial value problem $\mathbf{y}' = \mathbf{A}\mathbf{y}$ where

$$\mathbf{A} = \begin{bmatrix} -2 & -2 & -9 \\ -1 & 1 & -3 \\ 1 & 1 & 4 \end{bmatrix} \quad \text{and} \quad \mathbf{y}(0) = \begin{bmatrix} 6 \\ 1 \\ 2 \end{bmatrix}.$$