Mth 480 Systems of ODE
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Assignment 3 (Corrected)

NAME

5 Problems. Due April 23.

Problem 5. (Corrected): Compute the exponential e^{At} if

$$A = \begin{bmatrix} 0 & -1 & -1 \\ 20 & 18 & 20 \\ -14 & -13 & -15 \end{bmatrix}.$$

Hint: The characteristic polynomial is $\lambda^3 - 3\lambda^2 - 4\lambda + 12 = (\lambda - 2)(\lambda + 2)(\lambda - 3)$.

Problem 6. Compute the exponential e^{At} if

$$A = \begin{bmatrix} 1 & 4 & 3 \\ 2 & 4 & 2 \\ 3 & -4 & 1 \end{bmatrix}.$$

Hint: The characteristic polynomial is $\lambda^3 - 6\lambda^2 + 32 = (\lambda + 2)(\lambda - 4)^2$.

Problem 7. Compute the exponential e^{At} if

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & -3 \\ 0 & 3 & 2 \end{bmatrix}.$$

Hint: The characteristic polynomial is $(\lambda - 2)\left(\lambda^2 - 4\lambda + 13\right)$.

Problem 8. Compute the exponential e^{At} if

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

Hint: The characteristic polynomial is $(\lambda - 2)\left(\lambda^2 - 4\lambda - 5\right)$.

Problem 9. Solve the initial value problem $\dfrac{du}{dt} = Au + f(t), \quad u(0) = 0$, where A is the matrix in the previous problem and

$$f(t) = \begin{bmatrix} 1 \\ 0 \\ t \end{bmatrix}.$$
