

Math 217 - October 18, 2010

- Systems

1. Perform the matrix multiplications

$$\begin{bmatrix} 1 & 2 & 3 \\ -1 & 0 & 2 \\ -2 & 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 & -1 \\ 1 & 2 & -4 \\ 0 & 0 & 5 \end{bmatrix} =$$

2. Perform the matrix multiplications

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

3. Solve the system

$$\begin{aligned} x' &= -y & x(0) &= 2 \\ y' &= 10x - 7y & y(0) &= -1 \end{aligned}$$

Lecture Problems

4. Transform the equation into a first order system.

$$x^{(4)} + t^2 x^{(3)} - 5x'' + x = \sin^2 t$$

5. Transform the system into a first order system

$$\begin{aligned} x'' &= 2x - x' + y + t^2 \\ y'' &= y' - 2x' - t^3 \end{aligned}$$

6. In the previous problem, suppose you had an initial condition of $x(0) = 1, x'(0) = 2, y(0) = 3, y'(0) = 4$. What are the correct initial conditions for your system?