

Dr. Z.'s Calc4 Homework assignment 17

1. Convert the following diff.eq.s to a system of first-order diff.eq.s

a.

$$y^{(4)}(t) = \sqrt{(y'''(t) + t^3 + y'(t)y(t) + \cos y(t) + e^{y'(t)})}$$

b.

$$y^{(5)}(t) = ty''(t) + t^2y(t)$$

c.

$$y^{(5)}(t) = y(t)$$

2. Solve the initial value problem for the system, by using techniques for solving a single diff.eq. of higher order

a.

$$x_1'(t) = x_2(t) \quad , \quad x_2'(t) = -x_1(t) \quad ; \quad x_1(0) = 0 \quad , \quad x_2(0) = 1 \quad .$$

b.

$$x_1'(t) = 3x_1(t) - 2x_2(t) \quad , \quad x_2'(t) = 2x_1(t) - 2x_2(t) \quad ; \quad x_1(0) = 3 \quad , \quad x_2(0) = \frac{1}{2} \quad .$$

c.

$$x_1'(t) = -\frac{1}{2}x_1(t) + 2x_2(t) \quad , \quad x_2'(t) = -2x_1(t) - \frac{1}{2}x_2(t) \quad ; \quad x_1(0) = -2 \quad , \quad x_2(0) = 2 \quad .$$

d.

$$\begin{aligned} x_1'(t) &= x_3(t) \quad , \quad x_2'(t) = -x_1(t) - 1 \quad , \quad x_3'(t) = x_1(t) + 1 \quad ; \\ x_1(0) &= 3 \quad , \quad x_2(0) = 1 \quad , \quad x_3(0) = 0 \quad . \end{aligned}$$

3. If

$$A = \begin{pmatrix} 2 & 3 & 4 \\ -2 & 1 & 3 \\ 1 & -1 & 2 \end{pmatrix} \quad , \quad B = \begin{pmatrix} 1 & -1 & 0 \\ 2 & 0 & 1 \\ -1 & 0 & 2 \end{pmatrix}$$

Compute

a. AB

b. A^2

c. $AB - BA$.