

HOMWORK 3 SPRING 2005

Problem 1. Let $X(t)$ be solution to the initial value problem

$$\frac{dX}{dt} = AX, \quad X(0) = (0, 2, -2), \quad A = \begin{pmatrix} -3 & 2 & 2 \\ -3 & -1 & 1 \\ -1 & 2 & 0 \end{pmatrix}.$$

Then **A)** $X(1) = (3, 3, -3)$; **B)** $X(1) = \frac{1}{e}(1, 3, -3)$; **C)** $X(1) = \frac{1}{e^2}(1, 2, -2)$;
D) $X(1) = \frac{1}{2e}(1, 3, -3)$; **E)** $X(1) = \frac{1}{e^2}(0, 2, -2)$;
F) None above

Problem 2. Let $(x(t), y(t))$ be solution to the initial value problem

$$x' = 2x - y, \quad y' = 2y - x - 5e^t \sin(t), \quad x(0) = 2, \quad y(0) = 3.$$

Then **A)** $x(1) = e(\cos(1) - \sin(1))$; **B)** $x(1) = \frac{1}{e}(\cos(1) - 2\sin(1))$; **C)** $x(1) = e^2(2\cos(1) - 2\sin(1))$; **D)** $x(1) = e(2\cos(1) - 2\sin(1))$ **F)** None above.

Problem 3. Let $(x(t), y(t))$ be solution to the initial value problem

$$x' = 2x - y, \quad y' = x + 2e^t, \quad x(0) = y(0) = 0.$$

Then **A)** $x(1) = e$; **B)** $x(1) = 2e$; **C)** $x(1) = -2e$; **D)** $x(1) = -e$; **E)** $x(1) = 4e$ **F)** None above.

Problem 4. Let $(x(t), y(t))$ be solution to the initial value problem

$$x' = 4x + y - e^{2t}, \quad y' = y - 2x, \quad x(0) = 1, \quad y(0) = 0.$$

Then **A)** $x(-1) = e^{-2}$; **B)** $x(1) = 0$; **C)** $x(1) = -2e^2$; **D)** $x(1) = -2e$;
E) $x(1) = 4e$ **F)** None above.

Problem 5. Let $(x(t), y(t))$ be solution to the initial value problem

$$x' = y + e^t, \quad y' = x + t^2, \quad x(0) = -2, \quad y(0) = -1.$$

Then **A)** $y(1) = -2$; **B)** $y(1) = 0$; **C)** $y(1) = -2e$; **D)** $y(1) = -2e$; **E)** $y(1) = 4$ **F)** None above.