Quiz 2 of ODE.

1 Find the general solutions of the system

$$X' = \begin{pmatrix} -2 & 1 \\ 1 & -2 \end{pmatrix} X + \begin{pmatrix} 2e^{-t} \\ 3t \end{pmatrix}$$

2. (1) Solve the initial value problem:

$$X' = \begin{pmatrix} 1 & 1 & 2 \\ 0 & 2 & 2 \\ -1 & 1 & 3 \end{pmatrix} X, \quad X(0) = \begin{pmatrix} 2 \\ 0 \\ 3 \end{pmatrix} \quad (1, 3, 5 \text{ 排作答})$$

$$X(0) = \begin{pmatrix} 1 \\ 0 \\ 1.5 \end{pmatrix} \quad (2, 4, 6 \text{ 〃 〃})$$

(2) Describe the behavior of the solution as $t \to \infty$ ($\frac{1}{3}$ 排作答)

as $t \to -\infty$ (2, 4, 6 排作答)

3 For the system

$$x' = \begin{pmatrix} 2 & 2 \\ 8 & 2 \end{pmatrix} x \qquad (5)$$

(a) Find a fundamental matrix and the general solutions for the system (8)

(b) Find the fundamental matrix Φ such that $\Phi(0) = I$

(c) Find e^A? 47

4 Find a fundamental set of solutions of

$$x' = Ax = \begin{pmatrix} 2 & -2 \\ 2 & 6 \end{pmatrix} x \qquad (6)$$

and draw a phase portrait for this system.

5 Find the solution of the following initial value problem:

$$x' = \begin{pmatrix} 1 & 0 & 0 \\ -4 & 1 & 0 \\ 3 & 6 & 2 \end{pmatrix} x, \quad x(0) = \begin{pmatrix} -1 \\ 2 \\ -30 \end{pmatrix} \qquad (7)$$