

MATH2403A _____ 2-24-2000
 INSTRUCTOR: _____

TEST 3

NAME: _____
 STUDENT NO: _____

Show all work. Give your answers in terms of real functions only.

1. Given the system, $x' = \frac{1}{2}x - \frac{1}{4}y$, $y' = \frac{1}{4}x + y$,

(a) find the matrix A when the system is written in the form $\vec{x}' = A\vec{x}$,

(b) obtain the characteristic polynomial, $p(\lambda)$,

(c) find the eigenvalues $\lambda_1 = \underline{\hspace{2cm}}$, $\lambda_2 = \underline{\hspace{2cm}}$,

(d) and thus find the explicit matrix, e^{tA} .

(e) Find the general solutions, $x_g(t)$, $y_g(t)$ of the given system of equations.

2. Given the system, $x' = \frac{1}{2}x - \frac{1}{2}y$, $y' = x - \frac{1}{2}y$,

(a) find the matrix A when the system is written in the form $\vec{x}' = A\vec{x}$,

(b) obtain the characteristic polynomial, $p(\lambda)$,

(c) find the eigenvalues $\lambda_1 = \underline{\hspace{2cm}}$, $\lambda_2 = \underline{\hspace{2cm}}$,

(d) and thus find the explicit matrix, e^{tA} .

(e) Find the general solutions, $x_g(t)$, $y_g(t)$ of the given system of equations.

3 Find a set of particular solutions, $x_p(t)$, $y_p(t)$

for the system $x' = \frac{1}{2}x - \frac{1}{4}y$, $y' = \frac{1}{4}x + y + 9e^{\frac{3}{4}t}$,