

QUIZ #24, 11/15/07

MATH 54, FALL 2007

Show your work and justify your answers! Feel free to use both sides.

Name:

1. (6 pts) Suppose $\mathbf{x}_1 = \begin{bmatrix} e^{2t} \\ -e^{2t} \end{bmatrix}$ and $\mathbf{x}_2 = \begin{bmatrix} 4e^{5t} \\ e^{5t} \end{bmatrix}$ are solutions to a differential equation of the form $\mathbf{x}' = \mathbf{A}\mathbf{x}$.

(a) Compute the Wronskian of the solution set $\{\mathbf{x}_1, \mathbf{x}_2\}$.

(b) Is $\{\mathbf{x}_1, \mathbf{x}_2\}$ necessarily a fundamental solution set? If so, what is the general solution?

(c) Find a solution with $\mathbf{x}(0) = \begin{bmatrix} 3 \\ 1 \end{bmatrix}$.

2. (4 pts) Consider the differential equation $y''(t) + by'(t) + cy(t) = g(t)$.

(a) Write this in matrix form $\mathbf{x}' = \mathbf{A}\mathbf{x} + \mathbf{f}$.

(b) When is zero an eigenvalue of \mathbf{A} ? (State your answer in terms of b , c , and $g(t)$.)