Name: ID:

Quiz 4

1. (3 points) Find the eigenvalues λ_i of the following matrix

$$\mathbf{A} = \begin{pmatrix} 3 & 2 \\ 0 & 1 \end{pmatrix}.$$

Find an eigenvector ξ_i for each eigenvalue λ_i. Write down a general solution to

$$\mathbf{x}'(t) = \mathbf{A}\mathbf{x}(t)$$

using the fundamental set of solutions given by

$$\mathbf{x}^1 = \xi_1 e^{\lambda_1 t}, \quad \mathbf{x}^2 = \xi_2 e^{\lambda_2 t}.$$

Hint: the eigenvalues are real and distinct. You are not asked to prove that the solutions have $W \neq 0$.

2. Write as a system of ODEs the following higher order equations

   (a) (2 points) $y'' + 2y' = \sin(t)$

   (b) (1 point) $y''' - y'' - y' - y = 0$