

**QUIZ VI:MATH 274**

April 20, 2012.

NAME: \_\_\_\_\_

1. [6pts] Use the convolution theorem to find the solution of the following initial value problem. Express your answer as a convolution integral.

$$y'' + 2y' + y = g(t) \quad , \quad y(0) = 0 \quad , \quad y'(0) = 0$$

2. [6pts] Find the solution of the following IVP given the listed independent solutions  $\vec{x}_k$

$$\frac{d\vec{x}}{dt} = A\vec{x} \quad , \quad \vec{x}(0) = \begin{pmatrix} 1 \\ 0 \end{pmatrix} \quad , \quad \vec{x}_1(t) = \begin{pmatrix} 6e^t \\ e^t \end{pmatrix} \quad , \quad \vec{x}_2(t) = \begin{pmatrix} 5e^{3t} \\ e^{3t} \end{pmatrix}$$

**3.** [8pts] For the following problem, find two independent solutions  $\vec{x}_1(t)$  and  $\vec{x}_2(t)$  and then write out the fundamental matrix  $X(t)$ .

$$\frac{d\vec{x}}{dt} = A\vec{x} = \begin{bmatrix} -8 & -6 \\ 9 & 7 \end{bmatrix} \vec{x}$$