

Test Total

Name \_\_\_\_\_

**Exam 3      Ordinary Differential Equations**  
**23 Nov 2009    For full credit, show your work and use correct notation**

**Dr. Kreider**

1. Solve the initial value problem  $y' + 4y = 1$ ,  $y(0) = 937$  using Laplace Transforms.

15 pts

Name \_\_\_\_\_

Page 2 of 6

2. Solve the initial value problem  $y'' + 4y' + 29y = 0$ ,  $y(0) = 3$ ,  $y'(0) = 4$  using Laplace Transforms.

15 pts

Name \_\_\_\_\_

Page 3 of 6

3. Solve the initial value problem  $y'' + 9y = \sin(3t)$ ,  $y(0) = 1$ ,  $y'(0) = 0$  using Laplace Transforms.

#22  $t \sin(kt) \leftrightarrow \frac{2ks}{(s^2 + k^2)^2}$

#25  $\sin(kt) - kt \cos(kt) \leftrightarrow \frac{2k^3}{(s^2 + k^2)^2}$

15 pts
--------

Name \_\_\_\_\_

4. Solve the initial value problem  $y'' + 3y' + 2y = 1 - U(t - 2)$ ,  $y(0) = 1, y'(0) = 0$  using Laplace Transforms.

20 pts

Name \_\_\_\_\_

5. Solve the initial value problem  $y'' - 6y' - 7y = 4\delta(t - 3)$ ,  $y(0) = 0$ ,  $y'(0) = 8$  using Laplace Transforms.

15 pts

Name \_\_\_\_\_

6. Solve the initial value problem using Laplace Transforms:

$$\begin{aligned}x'(t) &= 3x(t) - 4y(t) & x(0) &= 3 \\y'(t) &= 4x(t) - 7y(t) & y(0) &= 9\end{aligned}$$

For reference, the inverse of  $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$  is  $\frac{1}{ad-bc} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$ .

20 pts
--------

--