MATH 225 – Worksheet #9 Name:_____

Sec_____

To get full credit, you must show all of your work.

1. Using the definition of a Laplace transform, find the Laplace transform of $f(t) = te^{4t}, s > 4$.

2. Find the Laplace transform of the following functions:
   a. $f(t) = \sin^2(t) + \cos^2(t)$

   b. $g(t) = u_4(t)\left(t^2 - 8t + 16\right)$

   c. $h(t) = u_1(t)\left(t^2\right)$

3. Find the inverse Laplace transform of the following:

a. $F(s) = \dfrac{4s+6}{s^2+4}$

b. $G(s) = \dfrac{s+2}{s^2+2s+5}$

c. $H(s) = \dfrac{4s^2+s}{s^3(s+1)^2}$

d. $J(s) = e^{-2s}\dfrac{16}{s(s^2+4s+8)}$

4. Solve the initial value problem: $y'' + y = 2e^t, y(0) = 1, y'(0) = -2$
   a. Using Laplace transforms

   b. Using the Method of Undetermined Coefficients

5. Solve the initial value problem $2y' + 6y = 36u_1(t), y(0) = 1$

6. Solve the initial value problem $y'' + 2y' + 9y = 1 - u_2(t) + \delta_3(t), y(0) = 0, y'(0) = 1$