Math 251 (§3) Homework 6

Due: Thursday, March-20-2008

Answers to the following should be turned in no later than the end of class on the above date. *Write your name on the assignment.* This assignment is worth a total of 50 points.

QUESTION 1: What are the Laplace transforms of the following?

i) $f(t) = e^{2t}\sin(t)$

ii) $f(t) = u_2(t)\left(t^2 - 2t\right)$

iii) $f(t) = 2t^3 e^{-\frac{t}{2}}$

iv) $f(t) = u_\pi(t)\cos(3t)$

v) $f(t) = u_{\frac{\pi}{2}} e^t \sin(t)$

QUESTION 2: What are the inverse Laplace transforms of the following?

i) $F(s) = e^{-2s}\dfrac{2}{s^3}$

ii) $F(s) = \dfrac{4}{s^2 - 6s + 10}$

iii) $F(s) = \dfrac{2s+3}{s^2+1}$

iv) $F(s) = \dfrac{3s+5}{(s+1)^2+16}$

v) $F(s) = \dfrac{4s^3 - 3s^2 + 6s + 10}{s^2\left(s^2 - 2s + 5\right)}$

vi) $F(s) = \dfrac{5s^2 - 16s + 6}{s(s-2)(s-3)}$

QUESTION 3: Solve the following initial value problems using the method of Laplace transforms.

i) $y'' + 8y' + 52y = 13u_2(t) \qquad y(0) = 0 \quad y'(0) = 1$

ii) $y'' + 9y = \begin{cases} 3 & t < 1 \\ 0 & 1 \le t \end{cases} \qquad y(0) = -1 \quad y'(0) = 0$

iii) $y'' + 4y = 1 - 2t \qquad y(0) = 1 \quad y'(0) = 2$