Homework#6 (Math 342)

(due Mon Dec 3)

Z: Advanced Engineering Mathematics , by D. G. Zill (6th Edition)

Note: Detail your work to receive full credit.

Sec. 4.3 (Z): 40, 42, 60, 68
(for the last problem, use the method of partial fractions and the property of t-translation).

Additional problems:

1) Evaluate the convolution

$$\sin(t) * \sin(t)$$

2) Use the convolution to find an explicit expression for the inverse Laplace transform of

(a)

$$F(s) = \frac{1}{s^2(s^2+k^2)}$$

(b)

$$F(s) = \frac{s}{(s-3)(s^2+1)}$$

3) Find the Laplace transform of

$$f(t) = te^{2t}\cos(3t)$$

4) Find the inverse Laplace transform of

$$F(s) = \arctan\left(\frac{3}{s+2}\right)$$

5) Solve the following initial value problems

(a)

$$ty'' - (4t+1)y' + 2(2t+1)y = 0\,, \quad y(0) = 0\,, \quad y'(0) = 0$$

(b)

$$ty'' + 2(t-1)y' - 2y = 0\,, \quad y(0) = 0\,, \quad y'(0) = 0$$