

EXAM 3, COURSE 267, SPRING 2005

Problem 1. Find the inverse Laplace transform for the function

$$F(s) = \frac{2}{s(s^2 + 16)}$$

If you are using the convolutions compute all integrals explicitly.

Problem 2. Using the method of the Laplace transform solve the initial value problem

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

Problem 3. Solve the initial value problem

$$y'' - 4y = 3\delta(t - 1), \quad y(0) = y'(0) = 0.$$

Problem 4. Given electric circuit with resistor $R = 1$, capacitor $C = \frac{1}{2}$ and generator. A generator produce an electricity

$$E(t) = \begin{cases} 1 & \text{for } 0 < t < 5 \\ 0 & \text{for } t > 5 \end{cases}$$

At the moment $t = 0$ the charge $Q(0) = 0$. Find charge $Q(t)$ at any moment of time.