Concordia University
Engineering and Computer Science

ENGR 311 TRANSFORM CALCULUS AND PARTIAL DIFFERENTIAL EQUATIONS

Question 1: Obtain the inverse Laplace Transform of the following functions:

$$F(s) = \frac{3(s^2 + s - 12) + (2s - 72)(s + 4)^2}{(s + 4)^2(s^2 + s - 12)}$$

$$F(s) = e^{-\frac{\pi}{2}s}\left[\frac{s}{s^2 + 10s + 29}\right]$$

$$F(s) = \frac{8}{s^3(s^2 - s - 2)}$$

Question 2: Find the Laplace Transform for each of the following functions:

$$\mathcal{L}\{e^{-2t}t\sinh t\}$$

$$\mathcal{L}\{(t - 3)\sin 2t\}$$

Question 3: Solve the following Integral equations:

$$\int_0^t y(x)y(t - x).dx = 6t^3$$

$$\int_0^t y(u)y(t - u).du = \frac{1}{2}[\sin t - t\cos t]$$

Question 4: Solve the differential equation:

$$y'' + 10y' + 9y = f(t),\ \ y(0) = 0, y'(0) = 0$$

$$where\ f(t) = \begin{cases} 0, & 0 \le t < 5 \\ 1,5 & \le t \le 7 \\ 0, & t > 7 \end{cases}$$