Quiz 2

MST 306

February 7, 2019

1. Solve the following initial value problem using Laplace transforms:

$$\begin{cases} y'' + 4y' + 4y = 4 \\ y(0) = 0 \text{ and } y'(0) = 0 \end{cases}$$

$$(p^2+4p+4)\mathcal{L}[y] = \frac{4}{p}$$

$$\Rightarrow \mathcal{L}[y] = \frac{4}{p(p+2)^2}$$

$$\Rightarrow y = 4 * te^{-2t}$$

$$= 4\int_0^t \tau e^{-2\tau} d\tau$$

$$= 4\left(-\frac{1}{2}\tau e^{-2\tau}\Big|_0^t + \int_0^t \frac{1}{2} e^{-2\tau} d\tau\right)$$

$$= -2te^{-2t} - e^{-2t} + 1.$$