Quiz 11 MATH 2280, ORDINARY DIFFERENTIAL EQUATIONS, SPRING 2024

NAME: A#:

Problem 1. Exercise 27.5c (10 points) Determine the Laplace using the tables provided. ou will have to use two identities.

$t\ e^{4t}\ step_3(t)$

Solution:

For

$t e^{4t} step_3(t)$

Since,

$\mathcal{L}[step_3(t)] = \frac{e^{-3s}}{s}$

then

$\mathcal{L}[e^{4t} step_3(t)] = \frac{e^{-3(s-4)}}{s-4}$

and then

$\mathcal{L}[t e^{4t} step_3(t)] = -\frac{d}{ds}\left(\frac{e^{-3(s-4)}}{s-4}\right)$

$= -\left(\frac{+e^{-3(s-4)}(-3) - e^{-3(s-4)}(1)}{(s-4)^2}\right)$

Problem 2. Exercise 28.8d (10 points) Using the Laplace transformation and translation identity, solve the following IVP.

$$y'' + 8\,y' + 17\,y = 0$$

with $y(0) = 3$ and $y'(0) = -12$.

Solution:

<u>Laplace Tran</u>

$$\left(s^2 Y(s) - s\,y(0) - y'(0)\right) + 8\left(s\,Y(s) - y(0)\right) + 17\,Y(s) = 0$$

$\hookrightarrow$ $(s^2 + 8s + 17)\,Y(s) - s(3) - (-12) - 24 = 0$

$\hookrightarrow$ $(s^2 + 8s + 17)\,Y(s) = 3s + 12 = 3(s+4)$

$\hookrightarrow$ $Y(s) = \dfrac{1}{s^2 + 8s + 17} \cdot (3)(s+4)$

$= \dfrac{3s}{s^2 \ldots}$ [illegible]

$= 3 \cdot \dfrac{s+4}{(s+4)^2 + 1}$

$= 3 \cdot e^{4t} \cos(t)$