Math 240 - Assignment 10

Name _____

April 18, 2024

Score _____

Show all work to receive full credit. Supply explanations when necessary. This assignment is due April 25.

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1. Find the convolution of $f(t) = g(t) = e^{at}$.

2. Use convolution to determine the inverse transform of $Y(s) = \dfrac{2}{s(s-1)}$.

3. Use the convolution theorem to find the inverse Laplace transform of $F(s) = \dfrac{s^2}{(s^2+4)^2}$.

4. Find the inverse Laplace transform of $F(s) = \ln \dfrac{s-2}{s+2}$.

5. Use the derivative-of-transform theorem to compute the Laplace transform of $f(t) = t^2 e^{5t}$. Use your table to check that your answer is correct.

6. Use Laplace transforms to transform the 2nd-order equation for $x(t)$ into a 1st-order equation for $X(s)$. Do not solve.

$$tx'' - x' + tx = 0, \quad x(0) = 0$$

7. Use Laplace transform techniques to solve:

$$tx'' + (t-2)x' + x = 0, \quad x(0) = 0.$$