Math 240 - Assignment 10

Name _____

November 14, 2024

Score _____

Show all work to receive full credit. Supply explanations when necessary. This assignment is due November 21.

1. Use Laplace transforms to solve the initial value problem.

$$y'' - 2y' + 5y = 0; \quad y(0) = 2,\ y'(0) = 4$$

2. Use Laplace transforms to solve the initial value problem. You may use technology to compute any partial fraction decompositions.

$$y'' - 4y = 0; \quad y(0) = 0,\ y'(0) = 5$$

3. Use Laplace transforms to solve the initial value problem. Do not use technology.

$$x''' + x'' - 6x' = 0; \quad x(0) = 0,\ x'(0) = 1,\ x''(0) = 1$$

4. Use Laplace transforms to solve the system of equations. Do not use technology.

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

$$y' = 2x, \quad y(0) = 1$$

5. Find the convolution of $f(t) = t$ and $g(t) = t^2$.

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

7. Suppose the Laplace transform of $g(t)$ exists. Use Laplace transforms to solve the initial value problem. Use convolution to write your final answer as an integral containing the function g.

$$y'' - 2y' + y = g(t); \quad y(0) = -1,\ y'(0) = 1$$