

NAME: _____

(write or print LEGIBLY)

1. Use the Laplace transform method to find the solution of the initial-value problem:

$$y'' + 2y' + y = x + e^x, \quad y(0) = 2, \quad y'(0) = -1.$$

2. Given the initial-value problem

$$y'' - y' - 6y = 2e^{-x}; \quad y(0) = \alpha, \quad y'(0) = -1.$$

What value(s) should be assigned to α so that the resulting solution will have limit 0 as $x \rightarrow \infty$?

3. Find $\mathcal{L}[f]$ if

$$f(x) = \begin{cases} x & 0 \leq x < 2 \\ 2 & 2 \leq x < 4 \\ x^2 + 1 & x \geq 4 \end{cases}$$

4. If $F(s) = \frac{s + (s - 1)e^{-\pi s}}{s^2 + 1}$, what is f ? Express f as a piecewise function.

5. Use the Laplace transform method to solve the initial-value problem

$$y'' - 3y' + 2y = f(x); \quad y(0) = 0, \quad y'(0) = 0$$

where

$$f(x) = \begin{cases} 3 & 0 \leq x < 2 \\ 2x - 4 & x \geq 2 \end{cases}.$$