

1) Calculate the one-sided Laplace transform of the function:

$$f(x) = \begin{cases} x, & x \in [0, 1), \\ 2 - x, & x \in [1, 2), \\ 0, & x \geq 2. \end{cases}$$

2) Find the one-sided inverse Laplace transforms of functions:

$$\frac{4s + 4}{s^2(s - 2)}.$$

3) Solve the problems:

$$y''(t) + a^2y(t) = 0, \quad y(0) = 0, \quad y'(0) = a.$$

4) Given function $f(t)$ such that its one-sided Laplace transform exists, explicitly compute the one-sided Laplace transform of function $g(t) = \int_0^t f(s)ds$ in terms of $\mathcal{L}(f)$.

5) Given function $f(t)$ such that its one-sided Laplace transform exists, find the one-sided Laplace transform of function $g(t) = t^n f(t)$ in terms of $\mathcal{L}(f)$.