(1) Suppose that \( f, g \) are functions defined on \(( -\infty, \infty )\). What is the convolution \( f * g \)? What if \( f, g \) are only defined on \([0, \infty )\)?

(2) If \( f \) is piecewise continuous and \(|f(t)| \leq 10e^{5t}\), for what values of \( s \) is \( F(s) \) guaranteed to exist?

(3) Find the Laplace transform of the following functions
   (a) \( f(t) = t \sin(t) \)
   (b) \( f(t) = t^2 \) if \( 0 < t < 2 \) and \( f \) is periodic of period 2.
   (c) \( f(t) = \begin{cases} e^t & \text{if } 0 \leq t < 5 \\ t & \text{if } t > 5 \end{cases} \)

(4) Use the Laplace transform to solve the following IVP
   \[ y'' - 2y' + y = 6t - 2; \quad y(-1) = 3, y'(-1) = 7 \]

(5) Use the Laplace transform to solve the following IVP
   \[ ty'' - ty' + y = 2; \quad y(0) = 2, y'(0) = -1 \]

(6) Use the Laplace transform to solve the following symbolic IVP
   \[ y'' + 5y' + 6y = e^{-t}\delta(t - 2); \quad y(0) = 2, y'(0) = -5 \]