Read each problem **very carefully** before starting to solve it and do only what is asked.
Each problem is worth around 5 points. It is necessary to show **all** your work. Correct
answers without explanations are worth 0 points. GOOD LUCK!!

1. [6 points] Consider the function

$$f(t) = \begin{cases} 3t, & \text{if } 0 \le t \le 1 \\ 3, & \text{if } 1 < t < 4 \\ 0, & \text{if } t \ge 4 \end{cases}$$

   Compute by hand the Laplace transform $F(s)$ of $f(t)$.

2. [4 points] Show from scratch that, given a function $y = f(t)$,

$$\mathcal{L}(f'') = s^2 F(s) - sf(0) - f'(0),$$

where $F(s)$ is the Laplace transform of f.

3. [2 points] Using the table, compute $F(s)$ if

$$f(t) = 7e^{-\frac{1}{2}t} + 9\sin 5t - 2\cos 5t.$$