

YOUR NAME: \_\_\_\_\_

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

1. Find the Laplace transform of the pulse  $f(t) = \begin{cases} 3, & \text{if } 0 \leq t < 5 \\ 2017, & \text{if } t = 5 \\ 0, & \text{if } t > 5 \end{cases}$ .

2. Show from scratch (using only the definition of the Laplace transform) that, if  $\mathcal{L}\{f(t)\} = F(s)$  and  $|f(t)| \leq Ke^{at}$ , for some constants  $K, a$ , then, for  $s > a$ , we have

$$\mathcal{L}\{f''(t)\} = s^2F(s) - sf(0) - f'(0).$$

3. Solve the initial value problem using the Laplace transform method:

$$y'' + 2y' - 35y = 0, \quad y(0) = 1, \quad y'(0) = 0.$$