

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. 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. Consider the function $F(s) = \frac{2s^2 + 5s + 7}{(s + 1)^3}$. Functions of this form are decomposed in partial fractions by taking denominators $s + 1$, $(s + 1)^2$ and $(s + 1)^3$ each with a constant numerator.
 - (a) Given the advice above, form a partial fraction decomposition of $F(s)$.

- (b) Find the inverse Laplace transform $f(t) = \mathcal{L}^{-1}\{F(s)\}$.

2. Use Laplace transforms to solve the initial value problem

$$y'' + 2y' + y = 4e^{-t}, \quad y(0) = 2, \quad y'(0) = -1.$$

3. Find $\mathcal{L}^{-1}\{F(s)\}$, where $F(s) = \frac{(s-2)e^{-7s}}{s^2 - 4s + 3}$.