1. (10 pts) Perform a partial fraction decomposition on this rational function. You may use the Heaviside Cover-Up method if you wish. Check your work. \[
\frac{17 - s}{s^2 + s - 6}
\]

2. (20 pts) Find the inverse Laplace transforms: 
   [A] \[ \mathcal{L}^{-1} \left\{ \frac{3}{(s + 2)^4} \right\} \]
   [B] \[ \mathcal{L}^{-1} \left\{ \frac{s}{s^2 - 4s + 13} \right\} \]

3. (20 pts) Write these Laplace transforms: 
   [A] \[ \mathcal{L} \{ t^n \} \]
   [B] \[ \mathcal{L} \{ e^{at} \cos kt \} \]

4. (10 pts) The Laplace transform is defined \[ \mathcal{L} \{ f(t) \} = \int_{t=0}^{\infty} e^{-st} f(t) \, dt \]. Use this definition to prove that \[ \mathcal{L} \{ 1 \} = \frac{1}{s} \]

5. (20 pts) Write these Laplace transforms: 
   [A] \[ \mathcal{L} \{ y' \} \]
   [B] \[ \mathcal{L} \{ y'' \} \]

6. (20 pts) Solve using the Laplace transform \[ y'' + y' - 2y = 2e^{-t}, \quad y(0) = 1, \quad y'(0) = -1 \]

7. (BONUS – 10 points) Solve using the Laplace transform \[ y' + 4y = e^{-4t}, \quad y(0) = 2 \]