Answers lacking justification will not receive full credit.

1. Find the solution $y(x)$ of the differential equation $y'' + 4y' + 5 = 0$ satisfying the conditions $y(0) = 2$ and $y'(0) = 4$.

2. True or False. Justify your answer if true; provide a counterexample if false.
   a) If $y(x)$ is a solution of the differential equation $y'' + y' - 6y = 0$, it is not a solution of the differential equation $y'' + y' + 6y = 0$.
   
   b) $y = xe^x$ is a solution of the equation $y'' - 2y' + y = 0$.
3. Consider the differential equation

\[ y^{-4} \frac{dy}{dx} + x^{-1}y^{-3} = x^{-4} \]  

\[ (*) \]

a) Let \( u = y^{-3} \). Rewrite equation \((*)\) in terms of \( \frac{du}{dx} \) and \( x \). (You may ask for the answer and forfeit your points for this part of the problem.)

b) Use the equation you found in part a) to find the general solution \( y(x) \) of equation \((*)\).