- 1. For each of the following check if the function given is or is not a solution to the differential equation given.
 - (a) Is $y = 2x^2 + 1$ a solution to $y \frac{1}{2}xy' = 1$?
 - (b) Is $f(t) = \sin(3t)$ a solution to 9f(t) + f''(t) = 0?
 - (c) Is $y = \frac{1}{t}$ a solution to $y' = y^2$?
 - (d) Is $y = \sqrt{t}$ a solution to $yy' = \frac{1}{2}$?
- 2. The following differential equations have a solution that you can get by using prior knowledge and a little trial-and-error. Find a solution to each. You don't need to show how you found your solution, just show that it works.
 - (a) y' = y (Hint: What function do you know which equals its own derivative?)

(b) f''(t) = -f(t)

(c) f'(t) = 3 (Hint: The answer is obvious. What may not be obvious is that this is in fact a differential equation!)

- 3. Give the order of each of the following differential equations.
 - (a) $t^3y' + (y'')^2 = 3y + 1$
 - (b) y'' = 3t + 1
 - (c) $f^{(5)}(t) + f''(t) = t^2 + t + f(t) 1$
- 4. Determine whether each of the following differential equations is linear. If not explain what is not permitted.
 - (a) $ty' + t^2y = \sin t$
 - (b) $yy' + t^2y = e^t$
 - (c) $te^y + y' = 2t + 1$
 - (d) $\sin(t)y'' \frac{1}{t}y' = y + 1$