**MATH 246 Homework 0.1**
**Justin Wyss-Gallifent**

---

**Directions:**

- Work should be done neatly and on separate paper.
- Enough work must be shown so that the steps you are taking is clear.

---

1. For each of the following check if the function given is or is not a solution to the differential equation given.
   (a) Is $y = \sin t + \cos(t)$ a solution to $y'' - y = 0$ ?
   (b) Is $f(t) = t^2$ a solution to $t^2 f''(t) - 2f(t) = f'(t)$ ?
   (c) Is $y = xe^{2x}$ a solution to $y' - 2y = e^{2x}$ ?
2. Guess and check to find a solution to the differential equation $y'' = A^2 y$ where $A > 0$ is unknown. You don't need to explain where your solution comes from, just show that it works.
3. Guess and check to find a solution to the differential equation $y'' = -A^2 y$ where $A > 0$ is unknown. You don't need to explain where your solution comes from, just show that it works.
4. For each of the following differential equations give the order and determine if the differential equation is linear. If it is not linear explain what is not permitted.
   (a) $3t^2 y'' - ty' + 5 = t$
   (b) $x^5 y''' + yy'' - e^x y = 0$
   (c) $2y'' - 3y' + e^y = y$
   (d) $\frac{f'(x)}{x^2} - \sin(x) f(x) = \cos(x)$