Problem Set 1:

1. Is $P = \dfrac{e\,e^t}{1 + c e^t}$ a family of solutions to the differential

   equation $\dfrac{dP}{dt} = P(1-P)$?

2. Find values of m so that $y = e^{mx}$ is a solution for
   the differential equation:

   a) $y' + 2y = 0$

   b) $y'' - 5y' + 6y = 0$.

3. Find values of m so that $y = x^m$ is a solution for
   the differential equation:

   a) $xy'' + 2y' = 0$

   b) $x^2 y'' - 7xy' + 15y = 0$

4. Create a differential equation for a radioactive decay scenario
   with a half life of 1600 years. Be sure to explain your reasoning.