1. [10 points] For each statement below, circle TRUE if the statement is always true; otherwise, circle FALSE. No partial credit on this page.

   a. [2 points] The differential equation \( \frac{dy}{dt} = y \sin(t + 1) - y \) is separable.
      \[ \text{True} \quad \text{False} \]

   b. [2 points] If money is placed into a bank account with continuous interest rate \( k \), then the amount of money, \( A \), at time \( t \) years can be modeled with the differential equation \( \frac{dA}{dt} = kt \).
      \[ \text{True} \quad \text{False} \]

   c. [2 points] Suppose the power series \( \sum_{n=1}^{\infty} C_n(x + 2)^n \) converges at \( x = -5 \), but diverges at \( x = 5 \). Then the series must diverge at \( x = 3 \).
      \[ \text{True} \quad \text{False} \]

   d. [2 points] The differential equation \( \frac{dy}{dx} = \cos(y) \) has an infinite number of equilibrium solutions.
      \[ \text{True} \quad \text{False} \]

   e. [2 points] Consider the differential equation \( \frac{dy}{dx} = x^2 \), and the solution that satisfies \( y(-1) = 1 \). If Euler’s method is used with step-size \( \Delta x = 0.1 \), then the Euler approximation for \( y(-0.5) \) is an underestimate of the real solution.
      \[ \text{True} \quad \text{False} \]