1. [14 points] Indicate if each of the following is true or false by circling the correct answer. Justify your answer.

   a. [2 points] If \( \int_{0}^{\infty} f(x)dx \) is divergent then \( \int_{1}^{\infty} f(x)dx \) is also divergent.

      True \hspace{1cm} False

   b. [2 points] If the median of a density function \( p(t) \) is 0, then \( p(t) \) is an even function.

      True \hspace{1cm} False

   c. [4 points] A curve is parametrized by the functions \( x(t) = 1 - t^2 \) and \( y(t) = t^4 + 3t^2 \) for \( 0 \leq t \leq 1 \). The concavity of the graph of the parametric curve is positive for \( 0 < t < 1 \).

      True \hspace{1cm} False

   d. [2 points] In polar coordinates, the coordinates \((2, \frac{\pi}{3})\) and \((-2, -\frac{7\pi}{3})\) represent the same point.

      True \hspace{1cm} False

   e. [2 points] If \( P(t) \) is a cumulative distribution function then \( \int_{-\infty}^{\infty} P(t)dt \) converges.

      True \hspace{1cm} False

   f. [2 points] The solutions to the differential equation \( \frac{dy}{dx} = 1 + y^2 + 3x^2 \) are increasing at every point.

      True \hspace{1cm} False