1. [8 points] Indicate if each of the following is true or false by circling the correct answer. No justification is required.

   a. [2 points] The function \( y(t) = \cos(4t) \) is a solution to the differential equation \( y'' + 16y = 0 \).

      True  False

   b. [2 points] \( \int_1^2 \tan x \, dx \) is an improper integral.

      True  False

   c. [2 points] If \( r = f(\theta) \) is a function in polar coordinates with \( f''(\theta) > 0 \), then its graph in the \( x-y \) plane is concave up.

      True  False

   d. [2 points] The median of the probability density function

      \[
      p(x) = \begin{cases} 
      \frac{1}{x^\pi} & x \geq 1, \\
      0 & x < 1.
      \end{cases}
      \]

      is equal to 2.

      True  False