6. [6 points] Consider the curve \( y = \sqrt{1 - x^2} \). Suppose a paperweight is formed by rotating this curve around the \( x \)-axis. This paperweight has a density given by \( \rho(x) = 2 + \cos(x) \) g/cm\(^3\). The units on both axes are centimeters (cm).

a. [3 points] Write an expression that gives the approximate mass, in grams, of a slice of the paperweight taken perpendicular to the \( x \)-axis at coordinate \( x \) with thickness \( \Delta x \).

( Assume that \( \Delta x \) is small but positive.) Your expression should not involve any integrals.

Answer: Mass of slice \( \approx \) _________________________________

b. [3 points] Write, but do not evaluate, an expression involving one or more integrals that gives the mass, in grams, of the paperweight.

Answer: Mass = _________________________________

7. [6 points] Determine whether the following series converges absolutely, converges conditionally, or diverges, and give a complete argument justifying your answer. In particular, be sure to show all work and include any convergence tests used.

\[
\sum_{n=1}^{\infty} \frac{(-1)^n \ln(n)}{n}
\]

Circle one: Converges Absolutely Converges Conditionally Diverges

Justification: