

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/cm³. 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 Δx . (Assume that Δx 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: