

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1. Use left-hand approximations with $n = 4, 8,$ and 16 subdivisions to approximate $\int_1^5 \frac{1}{x} dx$.

Compare these approximations with the true value of this integral. Approximately how many subdivisions would be required to obtain an approximation within 0.01 of the true value?

2. Derive the formula inside the front cover of the book for the circumference of a circle with radius r .
3. **Gabriel's Horn** is the mathematical object obtained by taking the region between the curve $y = 1/x$ and the x -axis to the right of $x = 1$ and rotating it around the x -axis. Find the volume of Gabriel's Horn.
4. Show that the surface area of Gabriel's Horn is infinite.