

MATH 111: CALCULUS
HOMEWORK DUE WEDNESDAY WEEK 13

Problem 1. Use the method of cylindrical shells to find the volume of an ellipsoid centered at the origin with major axis a and minor axis b . This is the solid of revolution formed by rotating $(x/a)^2 + (y/b)^2 = 1$ about the x -axis.

Problem 2. Draw the graphs of $y = x^n$ for $n = 1, 2, 3, 4, 5$ and x in $[0, 1]$ and make a prediction regarding whether the arclength of these curves is an increasing or decreasing function of n . Now write an integral expression for the length of $y = x^n$ on $[0, 1]$, explaining your work. The data at [this link](#) represents a numerical approximation of the arclength for $1 \leq n \leq 100$. What do you think the arclength approaches as $n \rightarrow \infty$? Does this make sense geometrically?

Problem 3. Find the surface area of the region generated by rotating the graph of $y = x^2$ for x in $[1, 3]$ about the y -axis.