

Workshop 5, Math 152

1. Sketch the graph of $y = (\ln x)/x$ in the viewing window $[0, 5] \times [-1, 1]$. Let R be the region bounded by: $y = (\ln x)/x$, $y = 0$, $x = 1$, $x = e$.

(a) Find the area of R .

(b) Find the volume of the solid obtained by rotating the region R

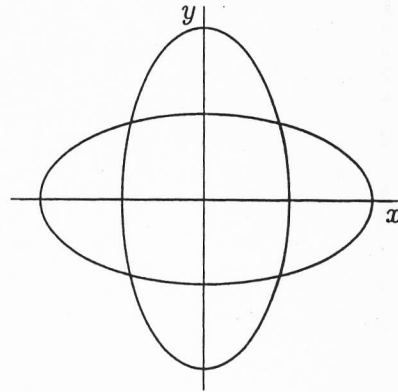
(i) around the x -axis; (ii) around the y -axis.

2. The area bounded by $y = 0$, $y = \tan x$, and $x = \pi/4$ is rotated around the line $y = -1$ to generate a solid of rotation. Find its volume.

3. Calculate the area within the two ellipses:

$$\frac{x^2}{2^2} + y^2 = 1 \quad \text{and} \quad x^2 + \frac{y^2}{2^2} = 1.$$

(See figure at right.)



4. Use appropriate trig substitutions to evaluate:

$$(a) \int \sqrt{4 + x^2} dx \quad (b) \int \sqrt{5 + 2x + x^2} dx$$

5. Find to four place accuracy the number d so that if the center of two circles of radius 1 are at distance d , the area common to the two circles is half of the area of either circle.

6. Calculate each of the indefinite integrals:

$$(a) \int \sec^4 x dx \quad (b) \int \sec^3 x \tan x dx \quad (c) \int \sec^2 x \tan^2 x dx \quad (d) \int \sec x \tan^3 x dx$$