

MTH142 Workshop 6: Areas and Volumes

Warm-Up

1. Sketch the region enclosed by the given curves. Decide whether to integrate with respect to x or y . Draw a typical approximating rectangle and label its height and width. Then find the **area** of the region.

(a) $y = x$, $y = (x - 2)^2$

(b) $y^2 = 1 - x$, $y^2 = 1 + x$

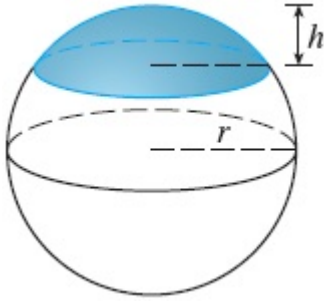
(c) $y = 2 - \cos(x)$, $y = \cos(x)$, $x = 0$, $x = 2\pi$

Problems

2. Use calculus to find the area of the triangle with the vertices $(0, 0)$, $(1, 2)$, and $(3, -4)$, then use geometry to check your work.

3. Find the area of the region bounded by the parabola $y = x^2$, the tangent line to this parabola at $(2, 4)$, and the x -axis.

4. Set up an integral to find the volume of a cap of height h of a sphere with radius r .



5. Find the **volume** of the solid obtained by rotating the region bounded by the given curves about the specified line. Sketch the region, and separately sketch the solid and a typical disk.

(a) $y = 1 - x^2$, $y = 0$; about the x -axis

(b) $y = \ln x$, $y = 1$, $y = 2$, and $x = 0$; about the y -axis (plotted below for convenience)

