AP Calc AB name Key
8.3 review opener

1. The base of a region between the line y=4 and the parabola $y = x^2$. The cross sections of the solid are perpendicular to the x-axis are:

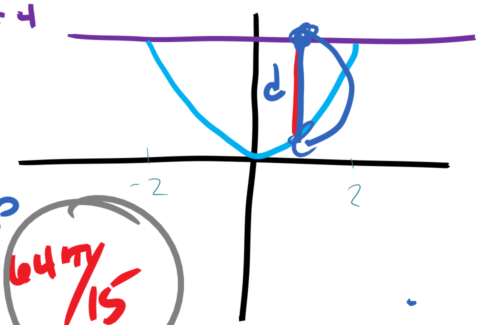
a. Semicircles:

$d = 4 - x^2$, $r = \frac{1}{2}(4 - x^2)$

$A = \pi\left(\frac{1}{2}(4-x^2)\right)^2 = \frac{1}{4}\pi(16 - 8x^2 + x^4)$

$V = 2 \cdot \frac{1}{8}\pi \int_0^2 (16 - 8x^2 + x^4)\,dx$

$\frac{64\pi}{15}$

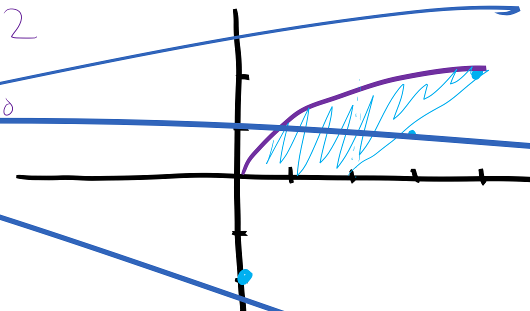


b. Squares:

$A = (4 - x^2)^2$

$V = 2\int_0^2 (16 - 8x^2 + x^4)\,dx = 512/15$

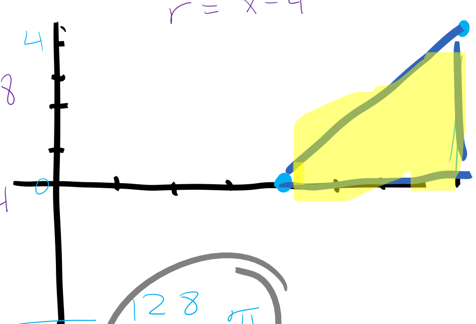
2. A region is bounded by $y = \sqrt{x}$, $y = x - 2$, *and*, $y = 0$. What is the volume of the solid generated when this region is rotated around the x-axis?



3. A region is bounded by $f(y) = 4 + y$, *and* $[0,4]$ Find the volume of the solid if it is rotated over:

a. The x-axis

$V = \pi \int_4^8 (x^2 - 8x + 16)\,dx = \pi\left[\frac{x^3}{3} - 4x^2 + 16x\right]_4^8 = \frac{64\pi}{3}$



b. The y-axis

$R = 8$, $r = 4 + y$

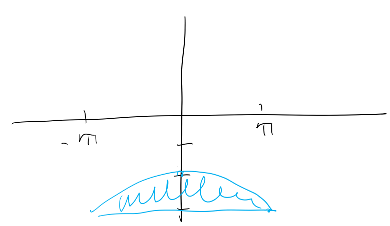
$V = \pi \int_0^4 (8y - y^2)\,dy = \frac{128}{3}\pi$

4. A region bounded by $y = \cos x - 2$, $y = -3$, *and* $[-\pi, \pi]$.

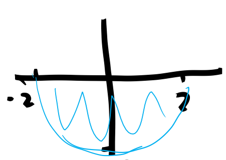
rotates over x-axis

$R = -3$, $r = \cos x - 2$

$V = 2\pi \int_0^\pi (9 - (\cos x - 2)^2)\,dx \approx 88.826$



5. Find the volume of the solid that lies between planes perpendicular to the x-axis at x=2 and x= -2. The cross sections perpendicular to the x-axis between the planes are equilateral triangles whose bases run from y=0 to $y = -\sqrt{4 - x^2}$.



$S = -\sqrt{4 - x^2}$

$V = 2\int_0^2 \frac{(4 - x^2)\sqrt{3}}{4} = \frac{\sqrt{3}}{2}\int_0^2 (4 - x^2)\,dx$