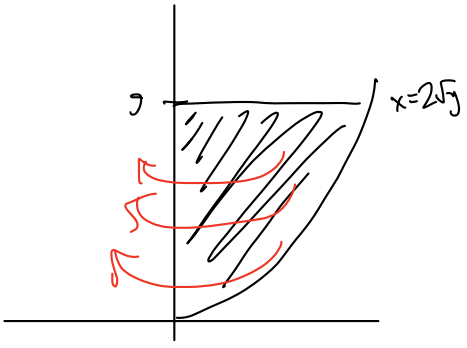
Math 1172
Homework #2

5.2 #15, 21

5.3 #10

6.1 #41

5.2 #15 $x = 2\sqrt{y}$, $x = 0$, $y = 9$, about y-axis

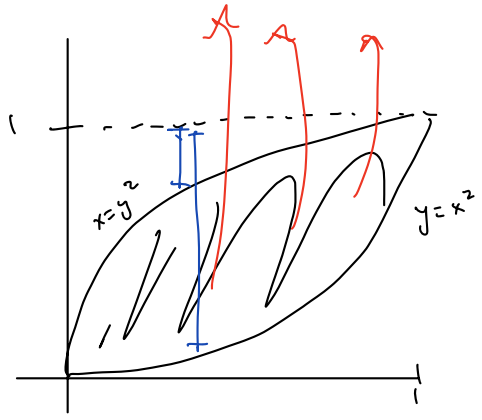


No inner radius, outer is $2\sqrt{y}$

$$\pi \int_0^9 (2\sqrt{y})^2 \, dy = \pi \int_0^9 4y \, dy$$

$$= 4\pi \left(\frac{1}{2} y^2 \right) \Big|_0^9 = 2\pi \cdot 9^2 - 2\pi \cdot 0^2$$

5.2 #21 $x = y^2$, $y = x^2$ about $y = 1$



integral will be dx,

so $x = y^2 \rightarrow y = \sqrt{x}$

inner = $1 - \sqrt{x}$

outer = $1 - x^2$

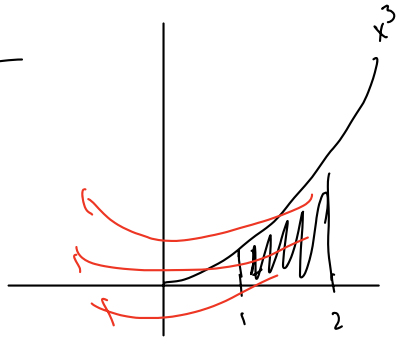
$$V = \pi \int_0^1 (1-x^2)^2 - (1-\sqrt{x})^2 \, dx = \pi \int_0^1 (1 - 2x^2 + x^4) - (1 - 2x^{1/2} + x) \, dx$$

$$= \pi \int_0^1 -2x^2 + x^4 + 2x^{1/2} - x \, dx$$

$$= \pi \left(-\frac{2}{3}x^3 + \frac{1}{5}x^5 + \frac{4}{3}x^{3/2} - \frac{1}{2}x^2 \right) \Big|_0^1$$

$$= \pi \left(-\frac{2}{3} + \frac{1}{5} + \frac{4}{3} - \frac{1}{2} \right) - \pi (0)$$

5.3 #10



$$V = 2\pi \int_1^2 x\, f(x)\, dx$$

$$= 2\pi \int_1^2 x \cdot x^3\, dx$$

$$= 2\pi \int_1^2 x^4\, dx$$

$$= 2\pi \cdot \frac{1}{5} x^5 \Big|_1^2 = \frac{2\pi}{5}\left(2^5 - 1^5\right)$$

6.1 #41 $f(x) = 3x^3 + 4x^2 + 6x + 5$, find $\left(f^{-1}\right)'(5)$

$$\left(f^{-1}\right)'(5) = \frac{1}{f'\left(f^{-1}(5)\right)}$$

$f^{-1}(5) = 0$, since $f(0) = 5$. So..

$$= \frac{1}{f'(0)}$$

now $f'(x) = 9x^2 + 8x + 6$, so $f'(0) = 6$

$$= \boxed{\frac{1}{6}}$$