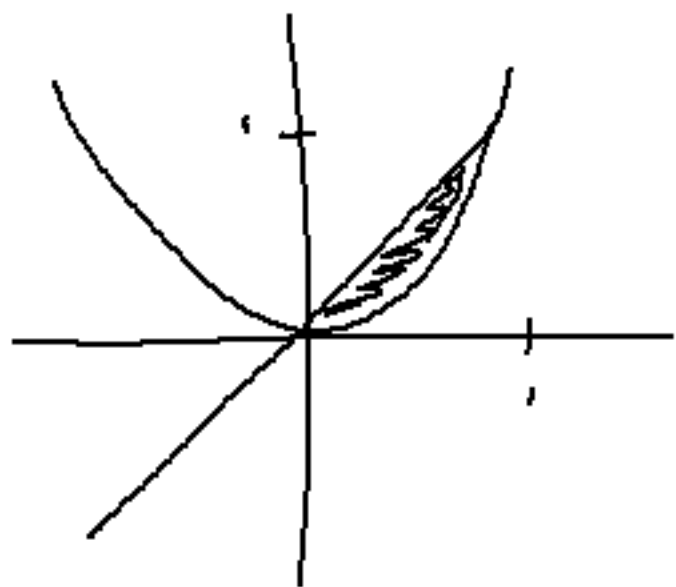


$$y = x$$
$$y = x^2$$

$$x = y$$
$$x = \sqrt{y}$$

about y -axis.



$$\pi \int_0^1 (\sqrt{y}^2 - y^2) dy$$

$$= .167 \pi$$

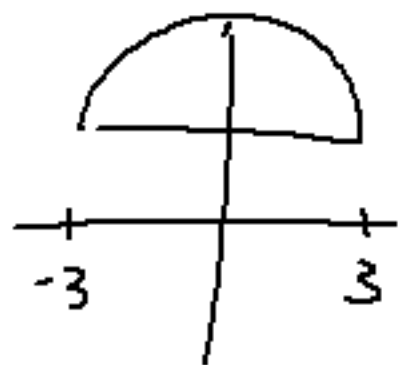
$$\approx .524$$

p 463 #6

$$y = 2$$

$$y = 4 - \frac{x^2}{4}$$

about x-axis



$$\pi \int_{-3}^3 \left(4 - \frac{x^2}{4}\right)^2 - 2^2 dx$$

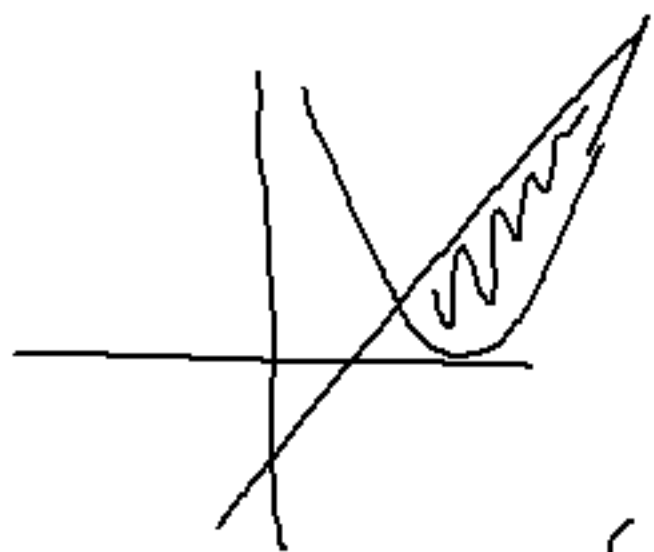
$$= 42.075 \pi$$

$$\approx 132.183$$

$$f(x) = (x-3)^2$$

$$g(x) = 2x - 1$$

about x-axis



$$\pi \int_{1.5505103}^{6.4494897} ((2x-1)^2 - ((x-3)^2)^2) dx$$

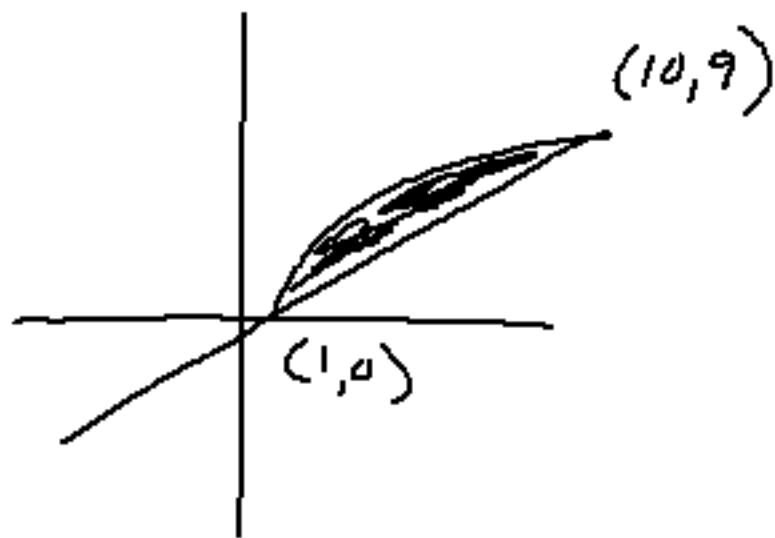
$$= 180.282 \pi \text{ or}$$

$$\begin{matrix} (x-3)^2 & (x-3)^2 \\ 566.374 & ((x-3)^2)^2 \end{matrix}$$

$$y = 3\sqrt{x-1} \quad x = \frac{y^2}{9} + 1$$

$$y = x-1 \quad x = y+1$$

about y-axis



$$\left(\frac{y}{3}\right)^2 = \sqrt{x-1}^2$$

$$\frac{y^2}{9} = x-1$$

$$\frac{y^2}{9} + 1 = x$$

$$\pi \int_0^9 (y+1)^2 - \left(\frac{y^2}{9} + 1\right)^2 dy$$

$$= 124.2\pi$$

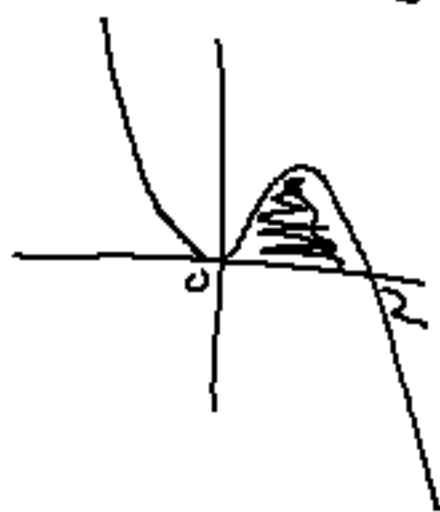
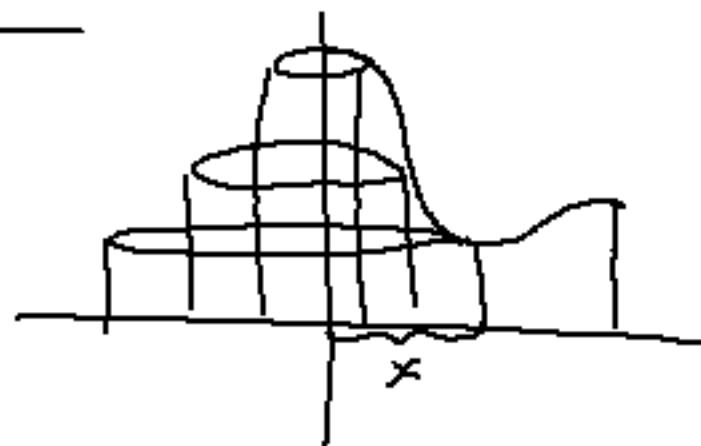
$$\approx 390.186$$

Shell Method

$$y = 2x^2 - x^3$$

$$y = 0$$

about y -axis



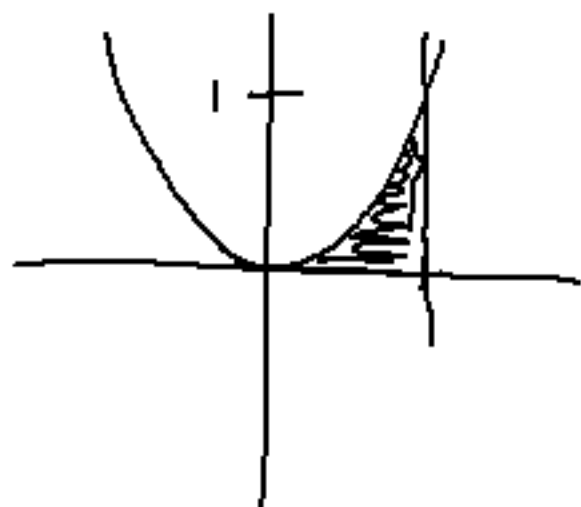
$$\int_0^2 2\pi x f(x) dx$$
$$= 10.053$$
$$\text{or } 3.2\pi$$

$$y = x^2$$

$$x = 1$$

$$y = 0$$

about y-axis



$$\int_0^1 2\pi x f(x) dx$$

$$\int_0^1 2\pi x (x^2) dx$$

$$= 1.571 \text{ or } .5\pi$$

OR

$$x = \sqrt{y}$$

$$x = 1$$

$$y = 0$$

$$\pi \int_0^1 (1^2 - \sqrt{y}^2) dy$$

$$= .5\pi \text{ or } 1.571$$

↙ Different
Disk

x-axis $y =$

y-axis $x =$

$$\pi \int f(x)^2 dx$$

$$\pi \int f(x)^2 - g(x)^2 dx$$

outer² - inner²

↙ Same
Shell

x-axis $x =$

y-axis $y =$

$$\int 2\pi x f(x) dx$$

$$\int 2\pi x (f(x) - g(x)) dx$$

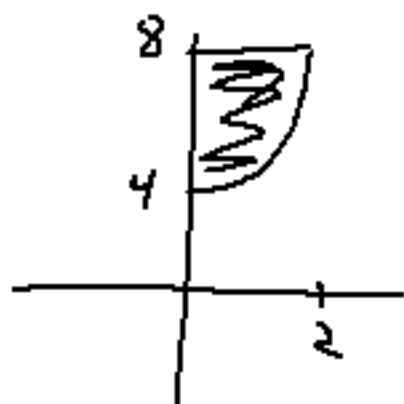
top - bottom

p 472 # 4

$$y = x^2 + 4$$

$$y = 8$$

$$x = 0$$



about y-axis

$$\int_0^2 2\pi x (8 - (x^2 + 4)) dx$$

$$= 25.133$$

$$\text{or } 8\pi$$

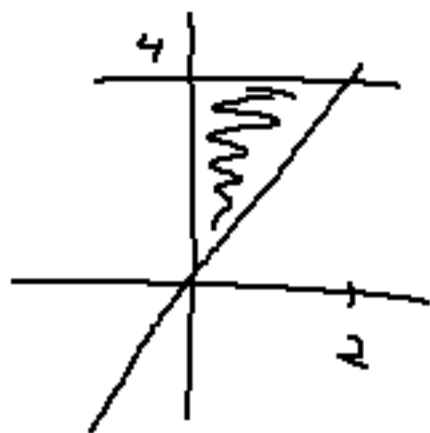
p 472 #10

$$y = 2x$$

$$y = 4$$

$$x = 0$$

about y-axis



$$\int_0^2 2\pi x (4 - 2x) dx$$

$$= 16.755$$

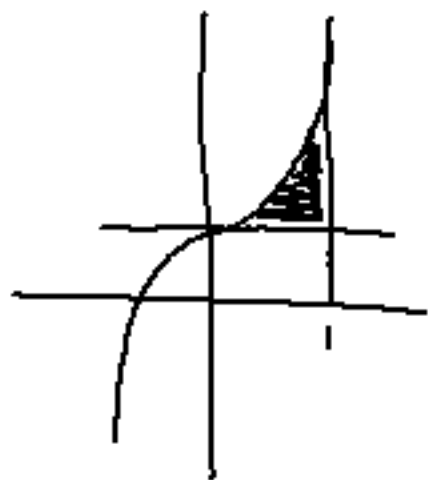
$$\approx 5.333\pi$$

$$y = x^3 + x + 1$$

$$y = 1$$

$$x = 1$$

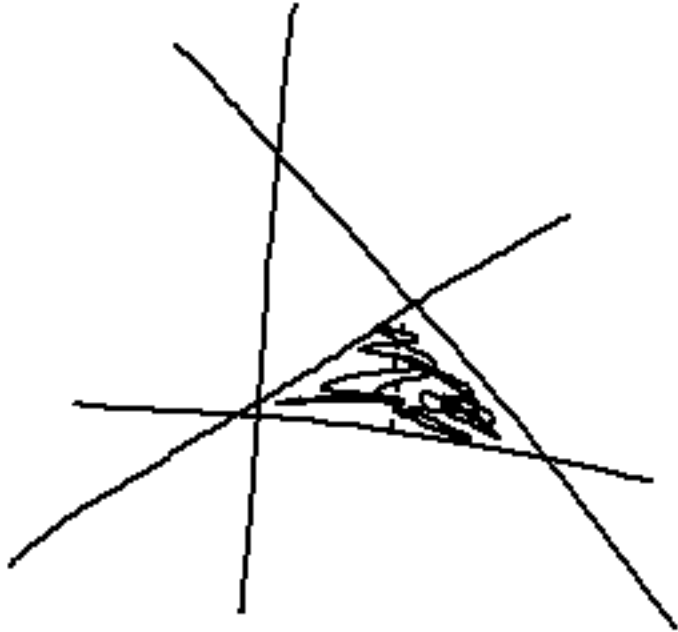
about x-axis



$$\pi \int_0^1 (x^3 + x + 1)^2 - 1^2 dx$$

$$= 2.376 \pi$$

$$\approx 7.465$$



p 463 # 5, 14a, 40

p 472 # 7, 9, 20, 25, 38