

## 126 HW #5

6.3 4, 7, 11, 15, 196.3 #4

$$V = \int_0^1 2\pi x \cdot x^2 dx = 2\pi \int_0^1 x^3 dx$$

$$= 2\pi \left. \frac{x^4}{4} \right|_0^1 = \frac{\pi}{2}$$

6.3 #7

$$y = 4(x-2)^2 \quad y = x^2 - 4x + 7$$



Intersections:

$$4(x-2)^2 = x^2 - 4x + 7$$

$$4(x^2 - 4x + 4) = x^2 - 4x + 7$$

$$4x^2 - 16x + 16 = x^2 - 4x + 7$$

$$3x^2 - 12x + 9 = 0$$

$$x^2 - 4x + 3 = 0$$

$$(x-1)(x-3) = 0$$

$$x = 1, 3$$

$$V = \int_1^3 2\pi x (x^2 - 4x + 7 - 4(x-2)^2) dx$$

$$= \int_1^3 2\pi x (-3x^2 + 12x - 9) dx = 6\pi \int_1^3 (-x^3 + 4x^2 - 3x) dx$$

$$= 6\pi \left( -\frac{x^4}{4} + \frac{4}{3}x^3 - \frac{3}{2}x^2 \right) \Big|_1^3$$

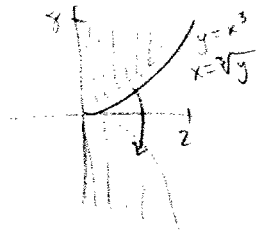
$$= 6\pi \left( -\frac{81}{4} + 36 - \frac{27}{2} - \left( -\frac{1}{4} + \frac{4}{3} - \frac{3}{2} \right) \right) = 16\pi$$

6.3 #11

$$y = x^3$$

$$y = 8$$

$$x = 0$$



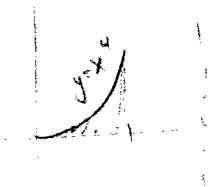
$$\int_0^8 2\pi y \cdot \sqrt[3]{y} dy$$

$$= 2\pi \int_0^8 y^{4/3} dy = 2\pi \frac{3}{7} y^{7/3} \Big|_0^8$$

$$= \frac{6\pi}{7} (8^{7/3}) = \frac{6\pi}{7} \cdot 2^7 = \frac{768}{7} \pi \approx 344.67$$

$$= 109.71 \pi$$

6.3 #15



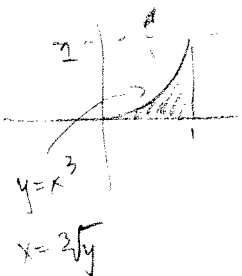
$$\int_0^1 2\pi \cdot (\text{dist from axis}) (\text{height}) dx$$

$$= \int_0^1 2\pi (2-x) x^4 dx = 2\pi \int_0^1 2x^4 - x^5 dx$$

$$= 2\pi \left( \frac{2}{5} x^5 - \frac{1}{6} x^6 \Big|_0^1 \right) = 2\pi \left( \frac{2}{5} - \frac{1}{6} \right)$$

$$= \frac{14}{30} \pi = \frac{7}{15} \pi \approx 1.466$$

6.3 #19



$$\int_0^1 2\pi (\text{dist to axis}) (\text{height}) dy$$

$$2\pi \int_0^1 (1-y) (1-\sqrt[3]{y}) dy$$

$$= 2\pi \int_0^1 1 - y - y^{1/3} + y^{4/3} dy = 2\pi \left( y - \frac{y^2}{2} - \frac{3}{4} y^{4/3} + \frac{3}{7} y^{7/3} \right) \Big|_0^1$$

$$= 2\pi \left( 1 - \frac{1}{2} - \frac{3}{4} + \frac{3}{7} \right) = \frac{5\pi}{14} \approx 1.212$$