HW 5 6.1 #4, 32 6.2 #2, 16, 32

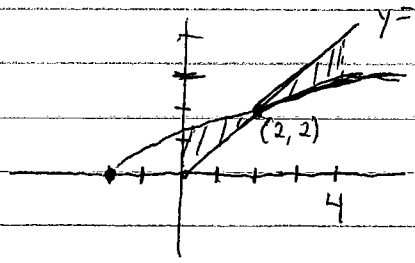
6.1 #4

$$\int_0^3 \left[(2y - y^2) - (y^2 - 4y)\right] dy$$

$$= \int_0^3 (6y - 2y^2)\, dy = 3y^2 - \frac{2}{3}y^3 \Big|_0^3$$

$$= 27 - \frac{2}{3}(27) = 9$$

32. $$\int_0^4 \left|\sqrt{x+2} - x\right| dx = \int_0^2 (\sqrt{x+2} - x)\, dx + \int_2^4 (x - \sqrt{x+2})\, dx$$



$$= \left(\frac{2}{3}(x+2)^{3/2} - \frac{1}{2}x^2\right)\Big|_0^2 + \frac{1}{2}x^2 - \frac{2}{3}(x+2)^{3/2}\Big|_2^4$$

$$= \frac{2}{3}(8) - 2 - \frac{2}{3}\sqrt{8} + 8 - \frac{2}{3}(6^{3/2}) - 2 + \frac{2}{3}(8)$$

$$= \frac{7}{3}\cdot 8 - 4 - \frac{2}{3}\sqrt{8} - \frac{2}{3}(6)^{3/2}$$

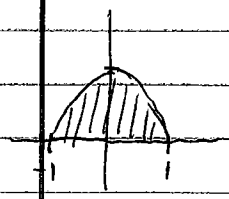
$$= \frac{44}{3} - \frac{4}{3}\sqrt{2} - 4\sqrt{6}$$

6.2 #2

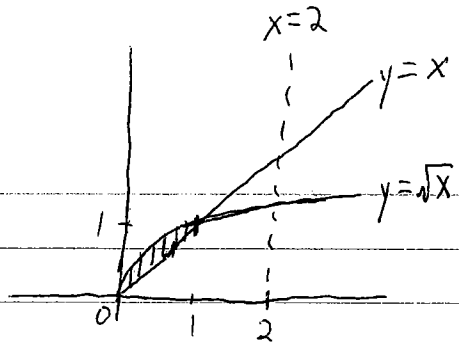
$$\int_{-1}^{1} \pi\left(1 - x^2\right)^2 dx = \pi \int_{-1}^{1} (1 - 2x^2 + x^4)\, dx$$

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

$$= \boxed{\frac{16\pi}{15}}$$



16.

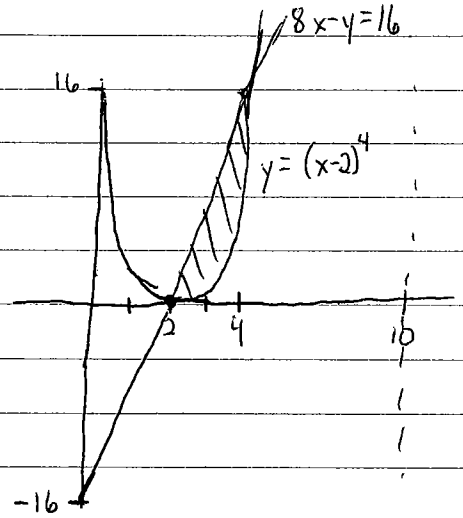


$$\pi\int_0^1 \left((2-y^2)^2-(2-y)^2\right)dy = \pi\int_0^1 \left(4-4y^2+y^4-4+4y-y^2\right)dy$$

$$= \pi\int_0^1 \left(y^4-5y^2+4y\right)dy = \pi\left(\frac{1}{5}y^5-\frac{5}{3}y^3+2y^2\right)\Big|_0^1$$

$$= \pi\left(\frac{1}{5}-\frac{5}{3}+2\right) = \pi\left(\frac{3}{15}-\frac{25}{15}+\frac{30}{15}\right) = \boxed{\frac{8\pi}{15}}$$

32.



$y=(x-2)^4$

$y^{1/4} = x-2$

$\boxed{x = y^{1/4}+2}$

$8x-y=16$

$8x = y+16$

$\boxed{x = \frac{1}{8}y+2}$

$$\pi\int_0^{16}\left[\left(10-\tfrac{1}{8}y-2\right)^2-\left(10-y^{1/4}-2\right)^2\right]dy$$

$$= \pi\int_0^{16}\left[\left(8-\tfrac{1}{8}y\right)^2-\left(8-y^{1/4}\right)^2\right]dy$$