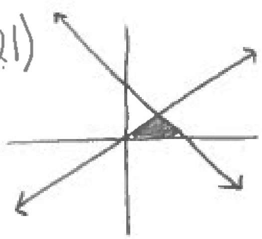
7.1 Area Between Two Curves Part II

Pg. 442 #'s 5, 6, 21, 25, 27, 34, 65, 66, 68

5) $\int_{-1}^{0}\left(\left(3(x^3-x)\right)-(0)\right)dx + \int_{0}^{1}\left((0)-\left(3(x^3-x)\right)\right)dx$

6) $\int_{0}^{1}\left(\left((x-1)^3\right)-(x-1)\right)dx + \int_{1}^{2}\left((x-1)-\left((x-1)^3\right)\right)dx$

21)



$\int_{0}^{1}\left((x)-(0)\right)dx + \int_{1}^{2}\left((2-x)-(0)\right)dx$

$\int_{0}^{1} x\,dx + \int_{1}^{2}(2-x)\,dx$

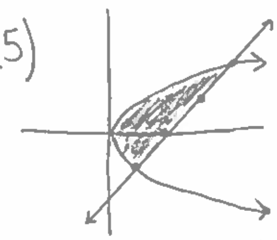
$\frac{1}{2}x^2\Big|_0^1 + \left(2x-\frac{1}{2}x^2\right)\Big|_1^2$

$\left(\left(\frac{1}{2}\right)-(0)\right)+\left((4-2)-\left(2-\frac{1}{2}\right)\right)$

$\frac{1}{2}+2-2+\frac{1}{2}$

$\boxed{1}$

25)



$y^2 = y+2$

$y^2-y-2=0$

$(y-2)(y+1)=0$

$y=2 \quad y=-1$

$\int_{-1}^{2}\left((y+2)-(y^2)\right)dy$

$\int_{-1}^{2}\left(-y^2+y+2\right)dy$

$\left(-\frac{1}{3}y^3+\frac{1}{2}y^2+2y\right)\Big|_{-1}^{2}$

$\left(-\frac{8}{3}+2+4\right)-\left(\frac{1}{3}+\frac{1}{2}-2\right)$

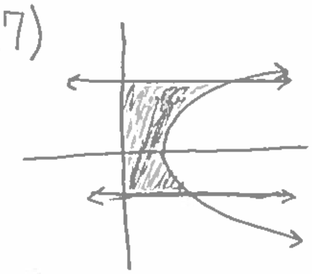
$-\frac{8}{3}+6-\frac{1}{3}-\frac{1}{2}+2$

$-\frac{9}{3}-\frac{1}{2}+8$

$-3-\frac{1}{2}+8$

$\boxed{4.5}$

27)



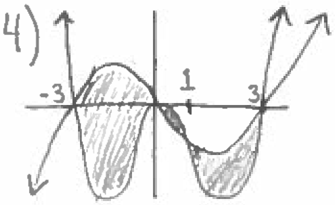
$$\int_{-1}^{2} \left((y^2+1) - (0)\right) dy$$

$$\left(\tfrac{1}{3}y^3 + y\right)\Big|_{-1}^{2}$$

$$\left(\tfrac{8}{3} + 2\right) - \left(\tfrac{-1}{3} - 1\right)$$

$$\boxed{6}$$

34)



$f(x) = x^4 - 9x^2$

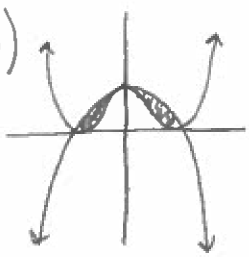
$g(x) = x^3 - 9x$

$$\int_{-3}^{0} (g(x) - f(x))\,dx + \int_{0}^{1} (f(x) - g(x))\,dx + \int_{1}^{3} (g(x) - f(x))\,dx$$

$$52.65 + 1.45 + 13.6$$

$$\boxed{67.7}$$

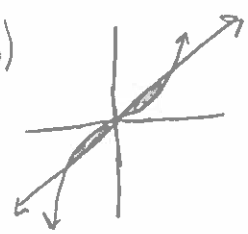
65)



The functions never change "upper" and "lower" status; $(x^4 - 2x^2 + 1) \geq (1 - x^2)$ for all x. $\int_{-1}^{1} \left((x^4 - 2x^2 + 1) - (1 - x^2)\right) dx$.

Alternatively, you can use symmetry: $2\int_{0}^{1} \left((x^4 - 2x^2 + 1) - (1 - x^2)\right) dx$.

66)



The functions change "upper" and "lower" status so the integral must be split where they switch.

$$2\int_{0}^{1} (x - x^3)\,dx$$

68) a) The area between the curves represents the difference in the cumulative deficit of the two proposals.

b) Proposal 2 is better because the cumulative deficit (area under the curve) is less than that of Propsal 1.