HW 8.2 p. 395 4, 7, 12, 14, 18, 19

Wednesday, March 11, 2015 5:48 PM

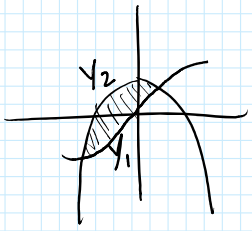
(4) $A=\int_0^1\left[(12y^2-12y^3)-(2y^2-2y)\right]dy=\int_0^1(10y^2-12y^3+2y)\,dy$

$=\left[\frac{10}{3}y^3-3y^4+y^2\right]_0^1=\left(\frac{10}{3}(1)^3-3(1)^4+(1)^2\right)-(0)=\frac{10}{3}-3+1=\boxed{\frac{4}{3}}$

(7) $y_1=\sin x \quad y_2=1-x^2$

Intersections: $x=.637, -1.410$

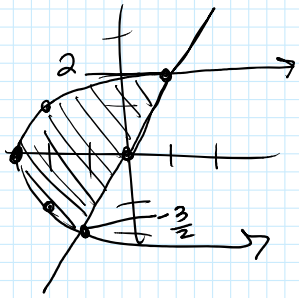
STORE→A STORE→B



$A=\int_B^A(Y_2-Y_1)dx=\boxed{1.670}$

(12) $y^2=x+3 \quad y=2x$

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



Intersections:

$y^2-3=\frac{1}{2}y$

$2y^2-y-6=0$

$(2y+3)(y-2)=0$

$y=-\frac{3}{2}, 2$

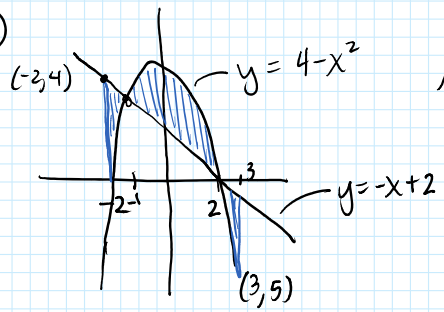
$A=\int_{-\frac{3}{2}}^{2}\left(\frac{1}{2}y-(y^2-3)\right)dy$

$=\left[\frac{1}{4}y^2-\frac{1}{3}y^3+3y\right]_{-\frac{3}{2}}^{2}$

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

$=\boxed{7.146}$

(14)



$A=\int_{-2}^{-1}\left[(-x+2)-(4-x^2)\right]dx+\int_{-1}^{2}\left[(4-x^2)-(-x+2)\right]dx+\int_{2}^{3}\left[(-x+2)-(4-x^2)\right]dx$

$=\left[-\frac{1}{2}x^2-2x+\frac{1}{3}x^3\right]_{-2}^{-1}+\left[2x-\frac{1}{3}x^3+\frac{1}{2}x^2\right]_{-1}^{2}+\left[-\frac{1}{2}x^2-2x+\frac{1}{3}x^3\right]_{2}^{3}$

$=\left(-\frac{1}{2}(-1)^2-2(-1)+\frac{1}{3}(-1)^3\right)-\left(-\frac{1}{2}(-2)^2-2(-2)+\frac{1}{3}(-2)^3\right)+\left(2(2)-\frac{1}{3}(2)^3+\frac{1}{2}(2)^2\right)-$

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

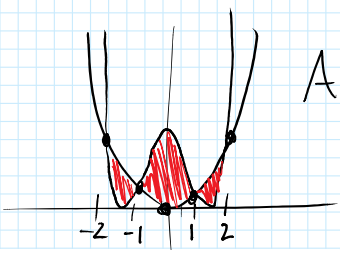
$=\boxed{8\frac{1}{6}}$

(18) $y=x^4-4x^2+4$

$y=x^2$

Intersections:

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



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

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

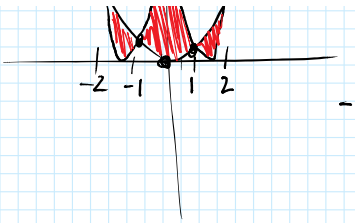
Intersections:

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

$x^4 - 5x^2 + 4 = 0$

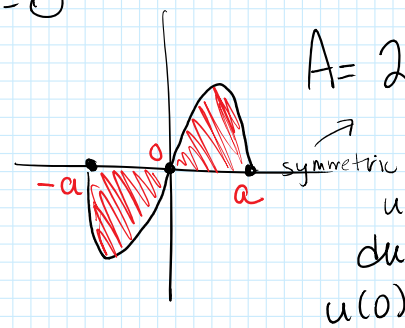
$(x^2 - 1)(x^2 - 4) = 0$

$x = \pm 1, \pm 2$



$$\int_{-1}^{1} \left((x^4 - 4x^2 + 4) - x^2\right) dx + \int_{1}^{2} \left(x^2 - (x^4 - 4x^2 + 4)\right) dx = \boxed{8}$$

(19) $y = x\sqrt{a^2 - x^2}$, $a > 0$ $\quad y = 0$



Intersections

$x\sqrt{a^2 - x^2} = 0$

$x = 0 \quad \sqrt{a^2 - x^2} = 0$

$a^2 - x^2 = 0$

$a^2 = x^2$

$x = \pm a$

$$A = 2\int_0^a x\sqrt{a^2 - x^2}\, dx = -\int_{a^2}^{0} \sqrt{u}\, du$$

$u = a^2 - x^2$

$du = -2x\,dx$

$u(0) = a^2$

$u(a) = 0$

$$= -\frac{2}{3} u^{\frac{3}{2}} \Big|_{a^2}^{0}$$

$$= -\frac{2}{3}(0)^{\frac{3}{2}} - -\frac{2}{3}(a^2)^{\frac{3}{2}}$$

$$= \boxed{\frac{2}{3}a^3}$$