Area Between Curves (cont'd)

ex.1 Find the area between the graphs of $y = 2x^2$ and $y = 16\sqrt{x}$.

Use systems to find where graphs intersect

sub in for y

$y = 2x^2$

$16\sqrt{x} = 2x^2$

Square both sides

$8\sqrt{x} = x^2$

$64x = x^4$

$0 = x^4 - 64x$

$0 = x(x^3 - 64)$

$x = 0 \quad x = 4$ interval

pt of intersection: $x = 0, y = 0$ and $x = 4, y = 32$

$A = \int_0^4 (16\sqrt{x} - 2x^2)\,dx$

$= \int_0^4 (16x^{\frac{1}{2}} - 2x^2)\,dx$

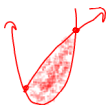
$= \left[\frac{2}{3}(16x^{\frac{3}{2}}) - \frac{2}{3}x^3\right]_0^4$

$= \frac{2}{3}(16(4)^{\frac{3}{2}}) - \frac{2}{3}(4)^3 - 0$

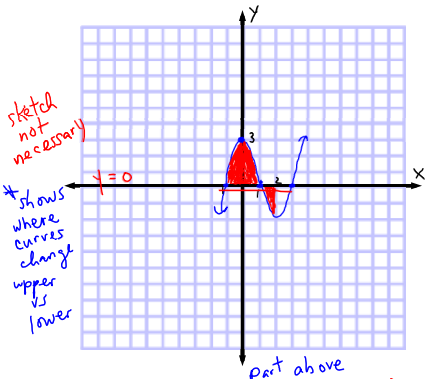
$= \frac{256}{3} - \frac{128}{3}$

$\frac{128}{3}\ u^2$

sub $x = 1$ to see which y-value is greater, this determines which fcn subtracts the other



ex.2 Find the area of the region, R, bounded by $y = x^3 - 3x^2 - x + 3$, the segment of the x-axis's between $x = -1$ and $x = 2$ and the line $y = 0$ as shown below.



sketch not necessary

* shows where curves change upper vs lower

part above

part below

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

solve to find where graph intersects w/ $y = 0$ ie x-ints

$p(-1) = 0$

	1	-3	-1	3
-1		↓ -1	4	-3
	1	-4	3	0

$(x+1)(x^2 - 4x + 3) = 0$

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

$x = -1 \quad x = 3 \quad x = 1$

$A = \int_{-1}^{1} (x^3 - 3x^2 - x + 3 - 0)\,dx + \int_1^2 (0 - (x^3 - 3x^2 - x + 3))\,dx$

$A = \left[\frac{x^4}{4} - x^3 - \frac{x^2}{2} + 3x\right]_{-1}^{1} + \left[-\frac{x^4}{4} + x^3 + \frac{x^2}{2} - 3x\right]_1^2$

$A = \frac{1}{4} - 1 - \frac{1}{2} + 3 - \left(\frac{1}{4} + 1 - \frac{1}{2} - 3\right) + \left(-4 + 8 + 2 - 6 - \left(-\frac{1}{4} + 1 + \frac{1}{2} - 3\right)\right)$

$= \frac{1}{4} - 1 - \frac{1}{2} + 3 - \frac{1}{4} - 1 + \frac{1}{2} + 3 - 4 + 8 + 2 - 6 + \frac{1}{4} - 1 - \frac{1}{2} + 3$

$6 - \frac{1}{4}$

$\frac{23}{4}\ u^2$

worksheet 6.1

1, 5, 7, 11, 13, 15

Review pg. 316 # 13 - 23 odd

373 # 3, 5, 7, 11, 13, 17, 19, 21

6.1

1) $\frac{32}{3}$

5) $19\frac{1}{2}$

7) $\frac{1}{6}$

11) $\frac{1}{3}$

13) 72

15) $\frac{59}{12}$