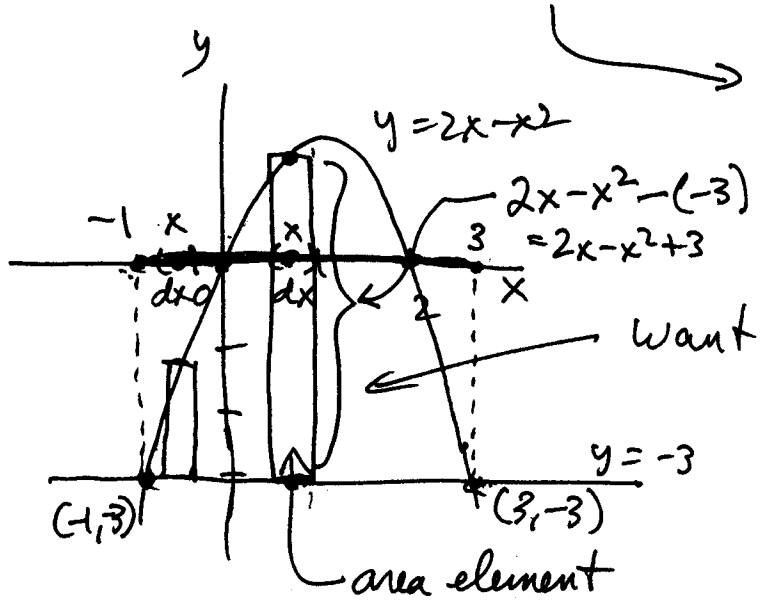
Examples from 5.6

#64, p412

$y = 2x - x^2$ $\quad y = -3$



$y = x(2-x)$

x-intercepts

$x = 0, \; x = 2$

$dA = (2x - x^2 + 3)\,dx$

Find intersection points.

$2x - x^2 = -3$

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

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

$x = -1, \; x = 3$

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

(top − bottom)

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

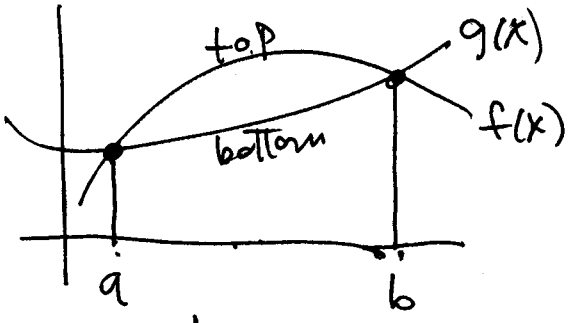
$$= (9 - 9 + 9) - \left(1 + \frac{1}{3} - 3\right)$$

$$= 9 - 1 - \frac{1}{3} + 3 = 11 - \frac{1}{3} = \frac{32}{3}.$$

#66) $y = x^2 - 2x$ $y = x$

Need to know: Which curve on top?
Limits of integration

No sketch:



$$A = \int_a^b (f(x) - g(x))\,dx$$

Intersection pts:

$x^2 - 2x = x$

$x^2 - 3x = 0$

$x(x-3) = 0$

$x = 0, \quad x = 3$

Check a point betw 0 + 3.

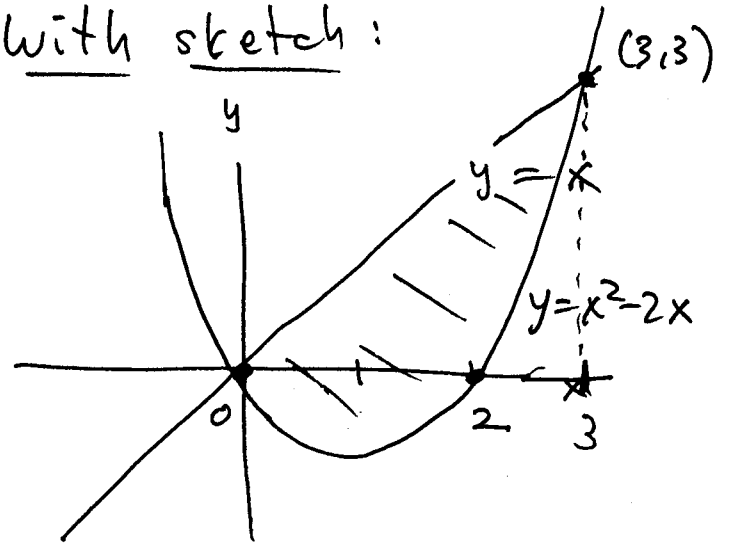
$y = x^2 - 2x$ bottom

$(1)^2 - 2(1) = -1$

$y = x$ top

$(1) = 1$

With sketch:



x-intercepts

$x^2 - 2x = 0$

$x(x-2) = 0$

$x = 0 \quad x = 2$

$x^2 - 2x = x$

$x^2 - 3x = 0$

$x(x-3) = 0$

$x = 0 \quad x = 3$

$$A = \int_0^3 x - (x^2 - 2x)\,dx$$

$$= \int_0^3 3x - x^2\,dx$$

$$A = \int_0^3 \left(x - (x^2 - 2x)\right) dx = \int_0^3 x - x^2 + 2x\,dx = \int_0^3 3x - x^2\,dx$$

etc...

$$A = \int_0^3 3x - x^2\,dx = \frac{3}{2}x^2 - \frac{1}{3}x^3 \Big|_0^3$$

$$= \left(\frac{3}{2}(3)^2 - \frac{1}{3}(3)^3\right) - \left(\frac{3}{2}(0)^2 - \frac{1}{3}(0)^3\right)$$

(the 0 terms)

$$= \frac{3}{2}\cdot 9 - 9 = \frac{9}{2}$$

$$A = \int_0^3 3x - x^2\,dx = \int_0^3 3x\,dx - \int_0^3 x^2\,dx$$

$$= 3\int_0^3 x\,dx - \int_0^3 x^2\,dx \quad \text{etc...}$$

FINAL EXAM

Omit: 2.1, 2.3, 2.6, 2.7

3.1, 4.2, 4.7, 5.1, 5.2

No parametric equations (this is part of 3.5)

All of Chapter 1.

Will be questions from 5.6