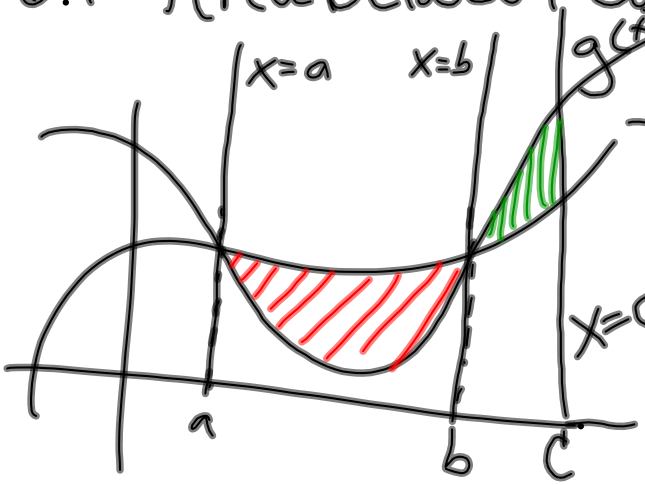
6.1 Area Between Curves



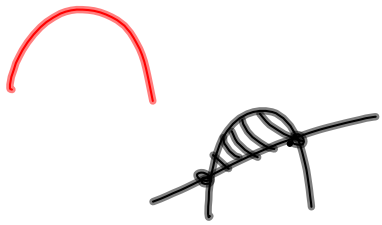
$$\int_a^b (f(x)-g(x))\,dx$$

$$\int_a^b (f(x)-g(x))\,dx + \int_b^c (g(x)-f(x))\,dx$$

6.1

#18. $f(x) = -x^2 + 4x + 1$

$g(x) = x + 1$



$-x^2 + 4x + 1 = x + 1$

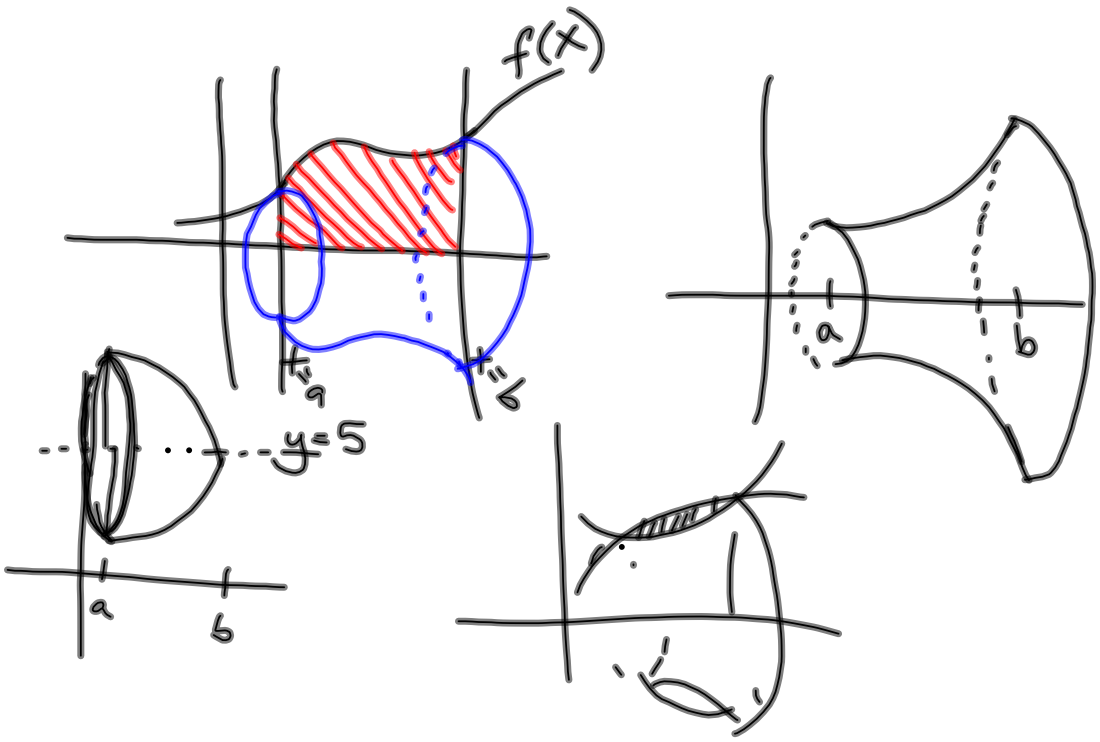
$0 = x^2 - 3x$

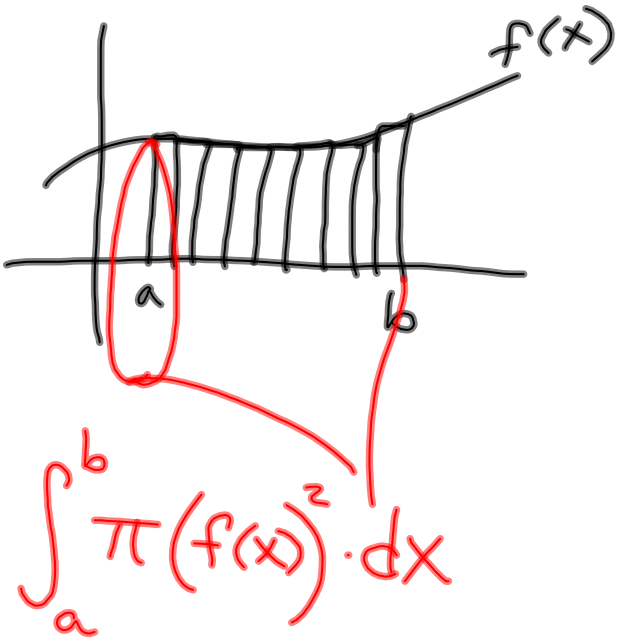
$0 = x(x-3)$

$x = 0, 3$

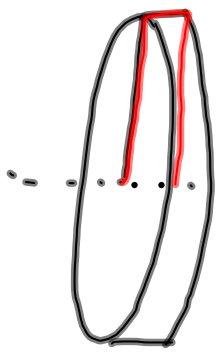
$$\int_0^3 \left[(-x^2+4x+1)-(x+1)\right] dx$$

6.2 Volume of Solids of Revolution





$$\int_a^b \pi (f(x))^2 \cdot dx$$



$V = \pi r^2 \cdot \omega$

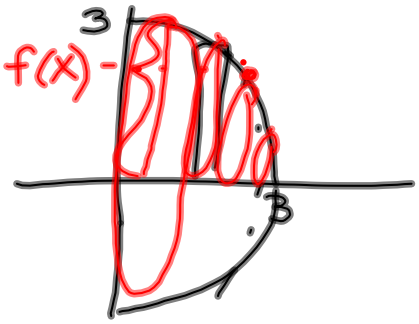
$\omega = \Delta x = dx$

$$\int_a^b \pi r^2 \cdot dx$$

r = some function of f

6.2

4. $y = \sqrt{9-x^2}$



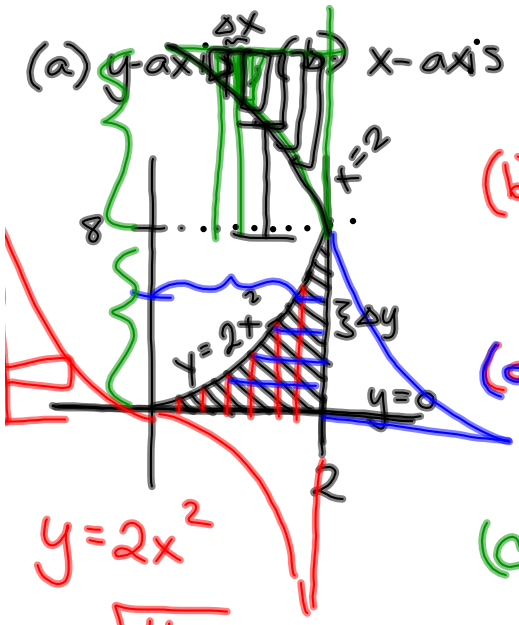
$$\int_0^3 \pi (9-x^2)\,dx$$

$$= 9\pi x - \frac{\pi}{3}x^3 \Big|_0^3$$

$$= 27\pi - 9\pi = \boxed{18\pi}$$

12. $y = 2x^2$, $y = 0$, $x = 2$

(a) y-axis, (b) x-axis, (c) $y = 8$, (d) $x = 2$



$y = 2x^2$

$x = \sqrt{\frac{y}{2}}$

(b) $\int_0^2 \pi (2x^2)^2\,dx$

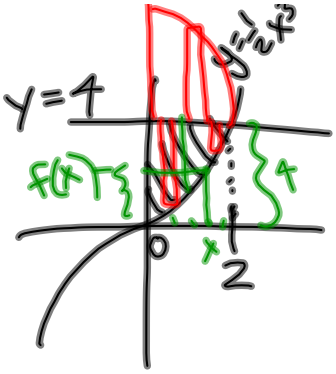
(d) $\int_0^8 \pi \left(2-\sqrt{\frac{y}{2}}\right)^2 dy$

(c) $\int_0^2 \pi 8^2\,dx - \int_0^2 \pi (8-2x^2)^2\,dx$

(a) $\int_0^8 \pi 2^2\,dy - \int_0^8 \pi \left(2-\sqrt{\frac{y}{2}}\right)^2 dy$

16. $y = \frac{1}{2}x^3$, $y = 4$, $x = 0$

rotate about $y = 4$



$$\int_0^2 \pi \left(4 - \frac{1}{2}x^3\right)^2 dx$$

6.1 HW # 1-9 odd, 43, 19