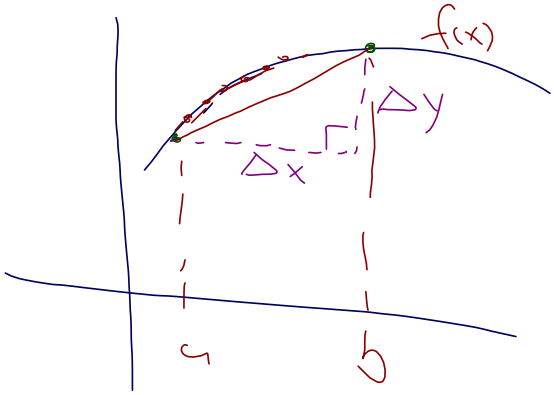
# 8.4 Length of Curves




$$\int_a^b \sqrt{(\Delta x)^2 + (\Delta y)^2}$$

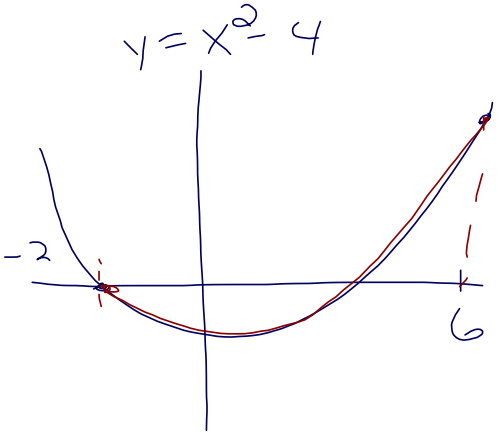
$$\int_a^b \sqrt{\frac{(\Delta x)^2}{(\Delta x)^2} + \frac{(\Delta y)^2}{(\Delta x)^2}}\, dx$$

$$\int_a^b \sqrt{1 + \left(\frac{\Delta y}{\Delta x}\right)^2}\, dx$$

$$\int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx$$

$$\int_a^b \sqrt{1 + \left(f'(x)\right)^2}\, dx$$

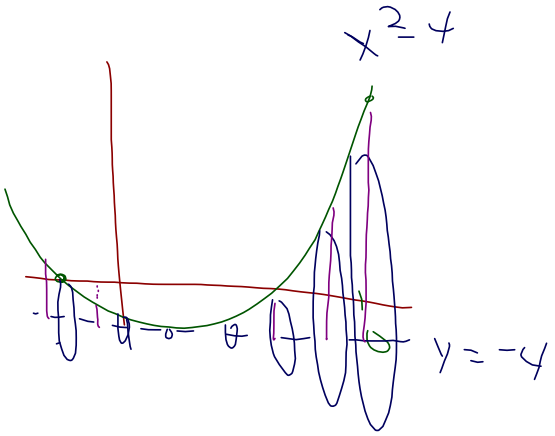
Ex

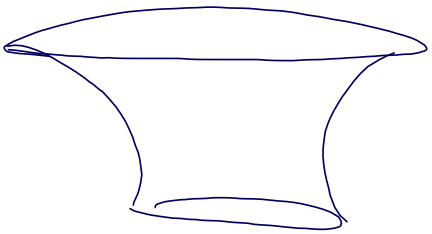



$f'(x) = 2x$

$$\int_{-2}^{6} \sqrt{1 + (2x)^2}\, dx = 41.567$$

# Surface Area



$$\int_a^b 2\pi r\sqrt{1+(f'(x))^2}\,dx$$

$$2\pi\int_a^b (y+4)\sqrt{1+\left((x^2-4)\frac{d}{dx}\right)^2}\,dx$$

$$2\pi\int_a^b ((x^2-4)+4)\sqrt{1+(2x)^2}\,dx$$

8.3 55, 56, 59, 60

8.4 2-4, 7-9, 12, 15 ,26