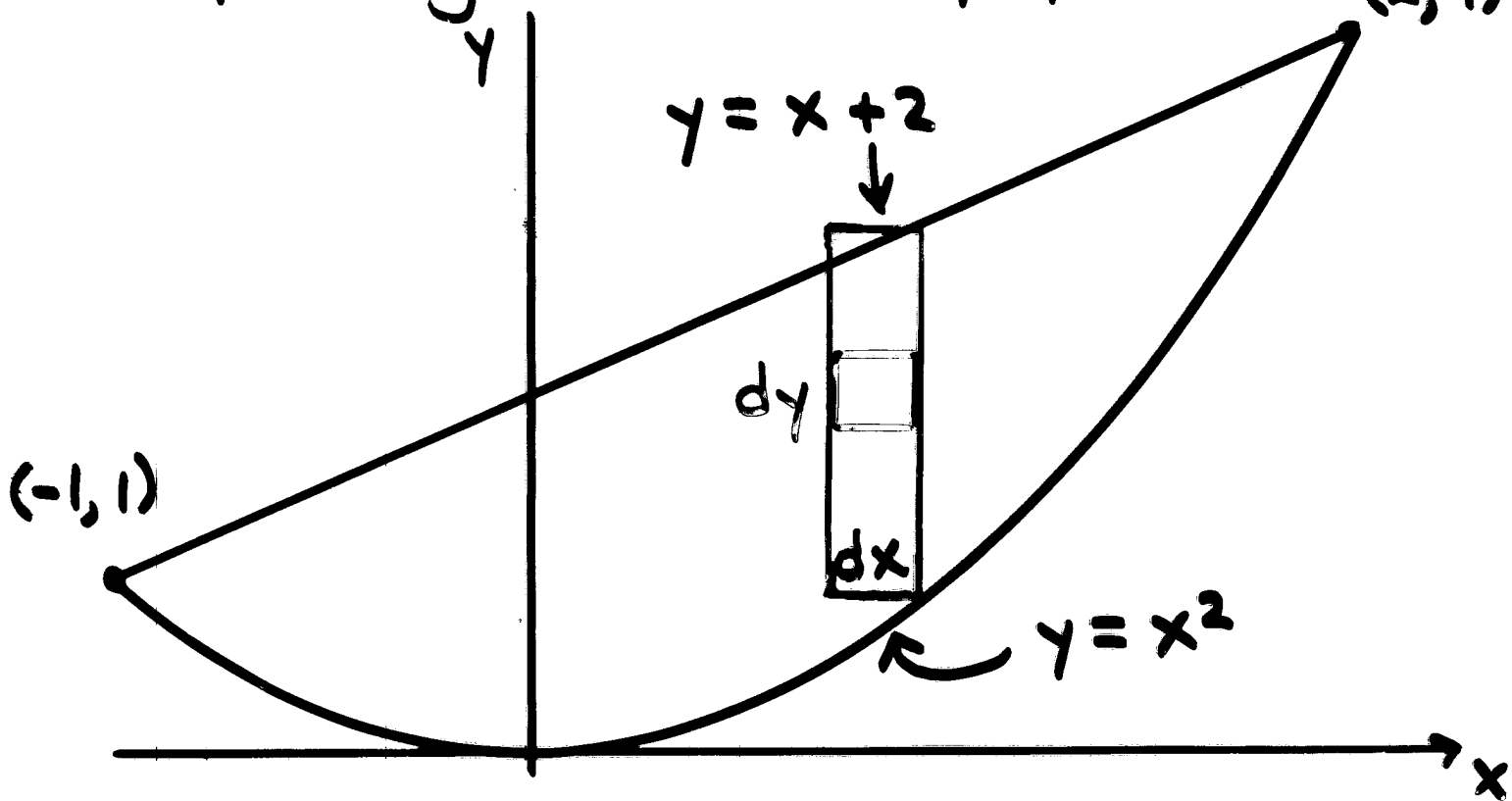


Ex. Find the volume of the solid bound above by the plane  $z = 6$  & below by the region in the  $xy$ -plane between curves

$$y = x^2 \quad \& \quad y = x + 2.$$

Graph region  $R$  in  $xy$ -plane.  $(2, 4)$



Outer:    LL :  $x = -1$                     thickness =  $dx$   
                  UL :  $x = 2$

Inner:    LL :  $y = x^2$                     thickness =  $dy$   
                  UL :  $y = x + 2$

Infinitesimal area :

$$dA = dy dx$$

So

$$V = \iint_R f(x, y) dA \quad z = f = 6$$

$$= \int_{-1}^2 \int_{x^2}^{x+2} 6 dy dx$$

$$= \int_{-1}^2 6 y \Big|_{y=x^2}^{y=x+2} dx$$

$$= \int_{-1}^2 6 [x+2 - x^2] dx$$

$$= 6 \left( \frac{1}{2} x^2 + 2x - \frac{1}{3} x^3 \right) \Big|_{-1}^2$$

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

$$= 27 \text{ units}^3$$