

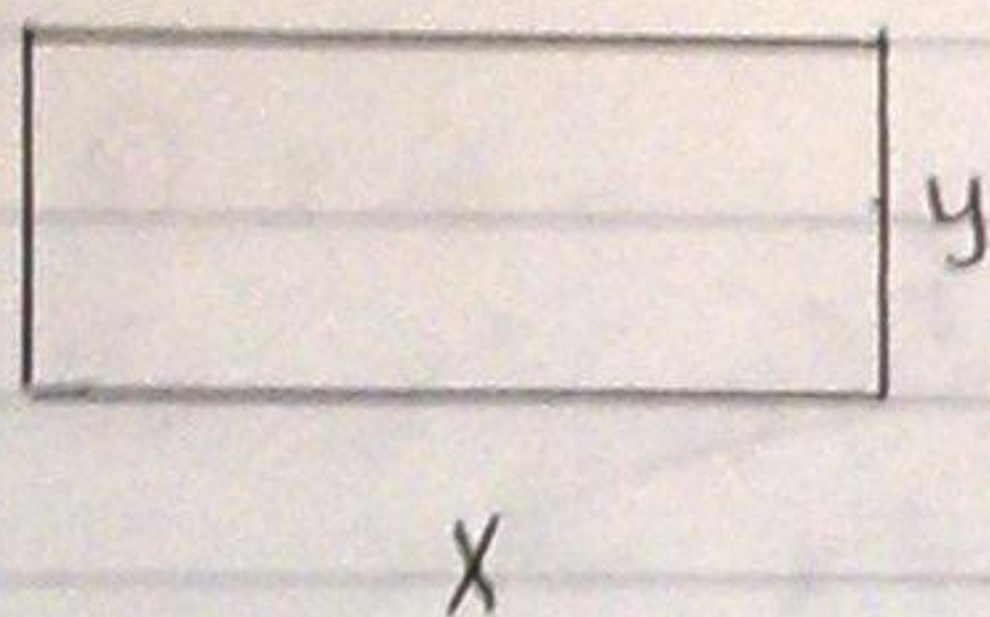
## lec: 1

$$y = f(x)$$

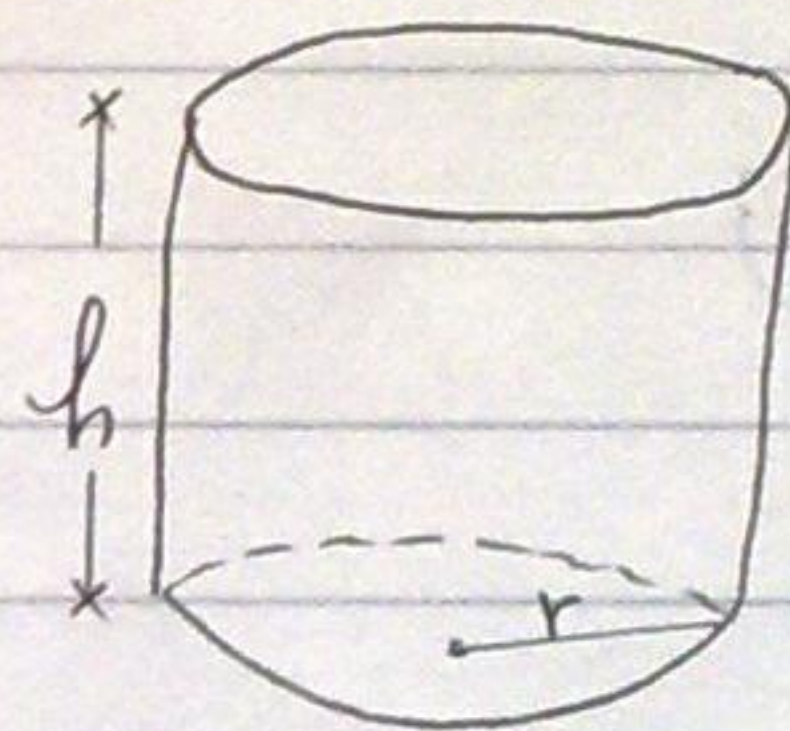
(function of one variable)

- 1 Definition
- 2 domain & Range
- 3 limits & continuity
- 4 Graph
- 5 Differentiation
- 6 Max. & min. Values
- 7 Integration

\* function of several Variables (function of two or more Variables)



$$S = (xy) \rightarrow 2 \text{ Variables}$$

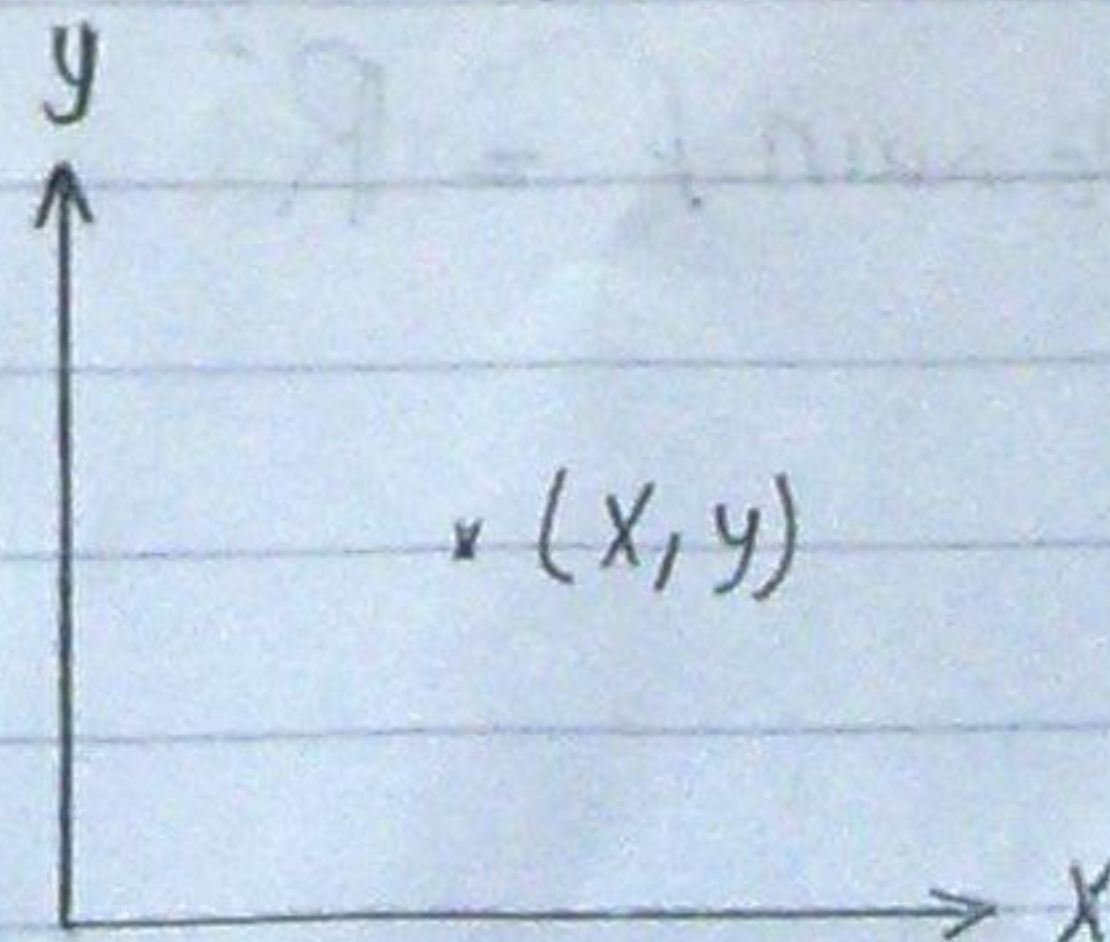
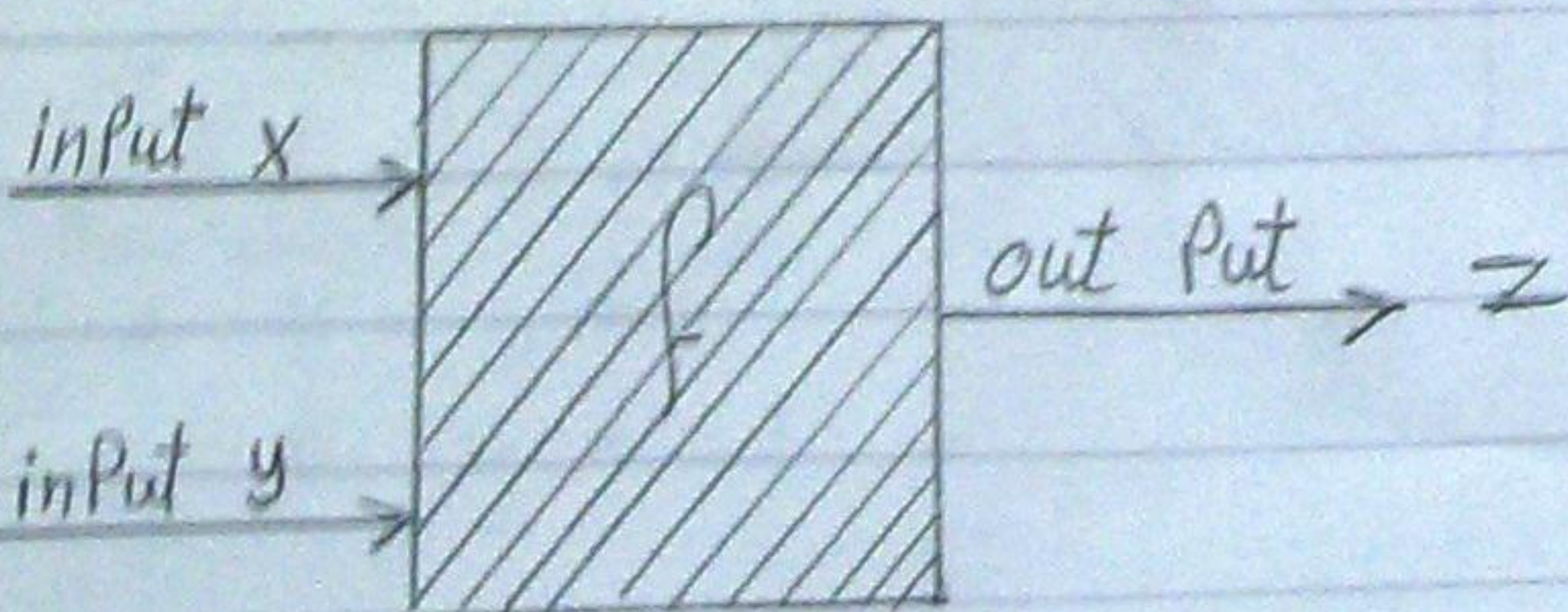


$$V = \pi(r^2 h) \rightarrow 2 \text{ Variables}$$

### 1 Definition

"A function  $f$  of two Variables  $x$  and  $y$  is a rule that assigns a Unique real number  $f(x, y)$  to each Point  $(x, y)$  in some set  $D$  in the  $xy$  plane"

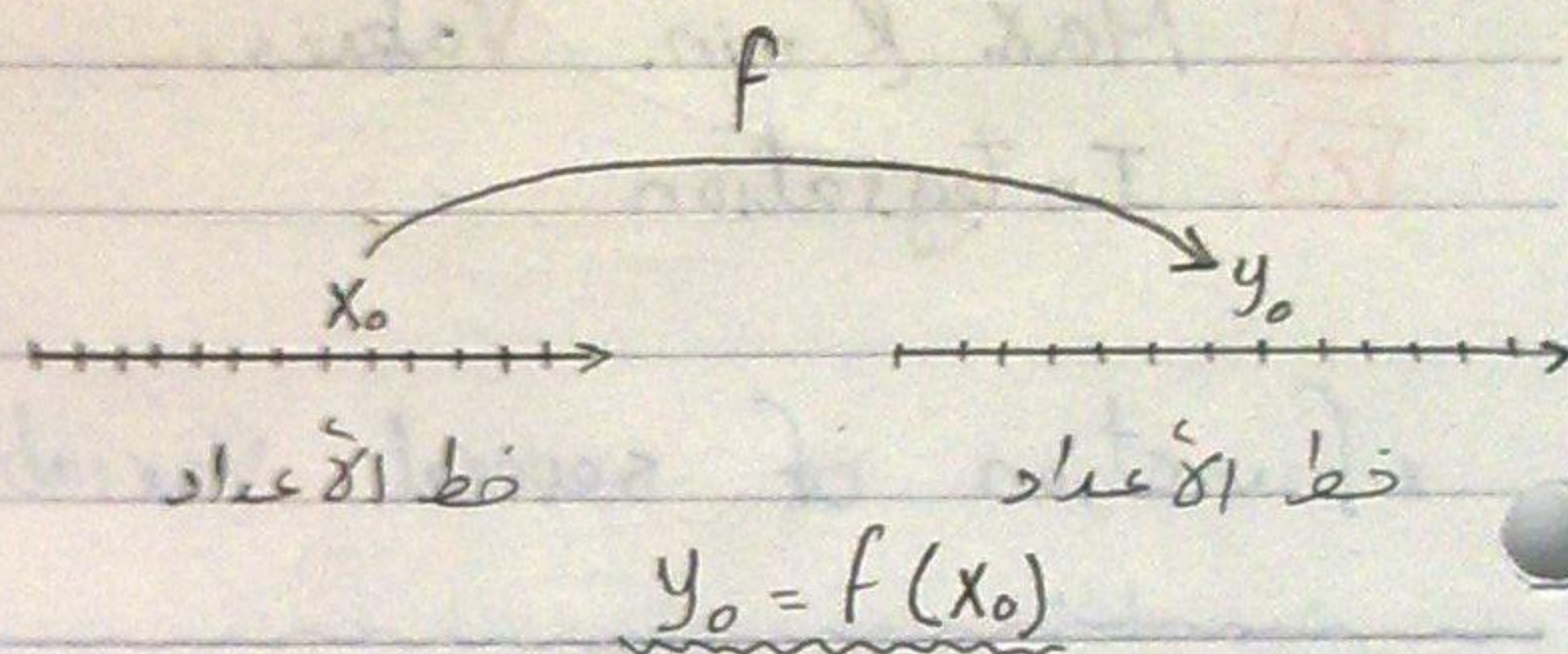
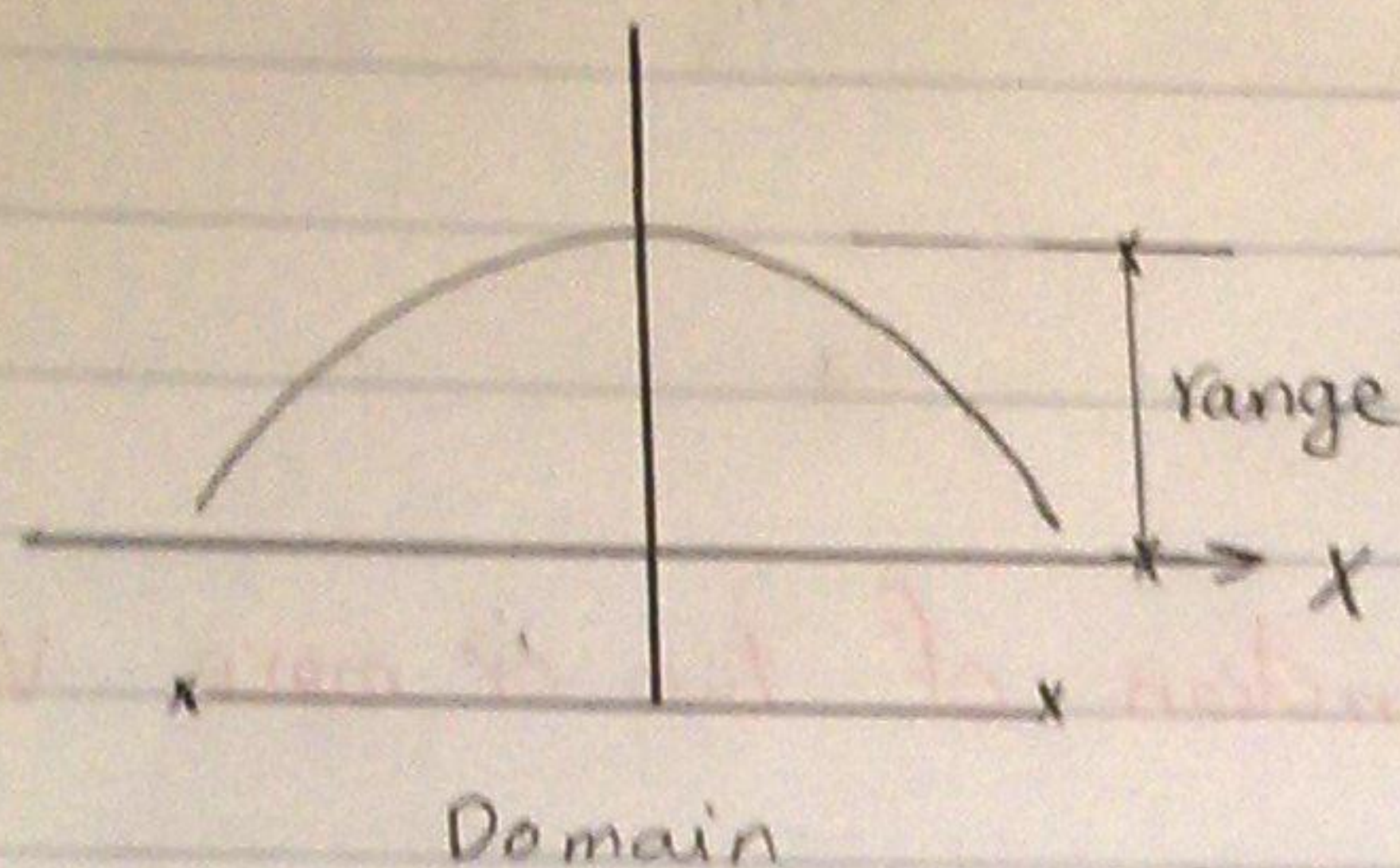
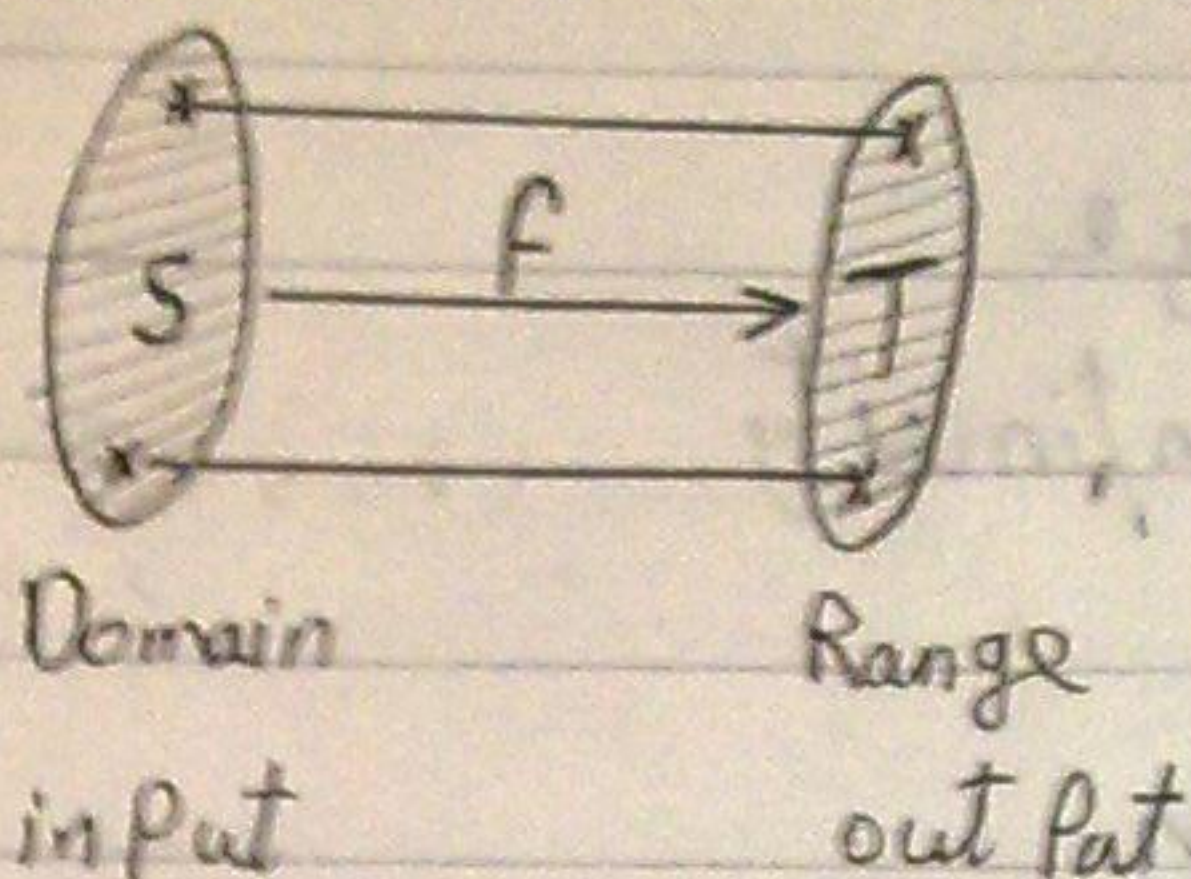
$$z = f(x, y)$$



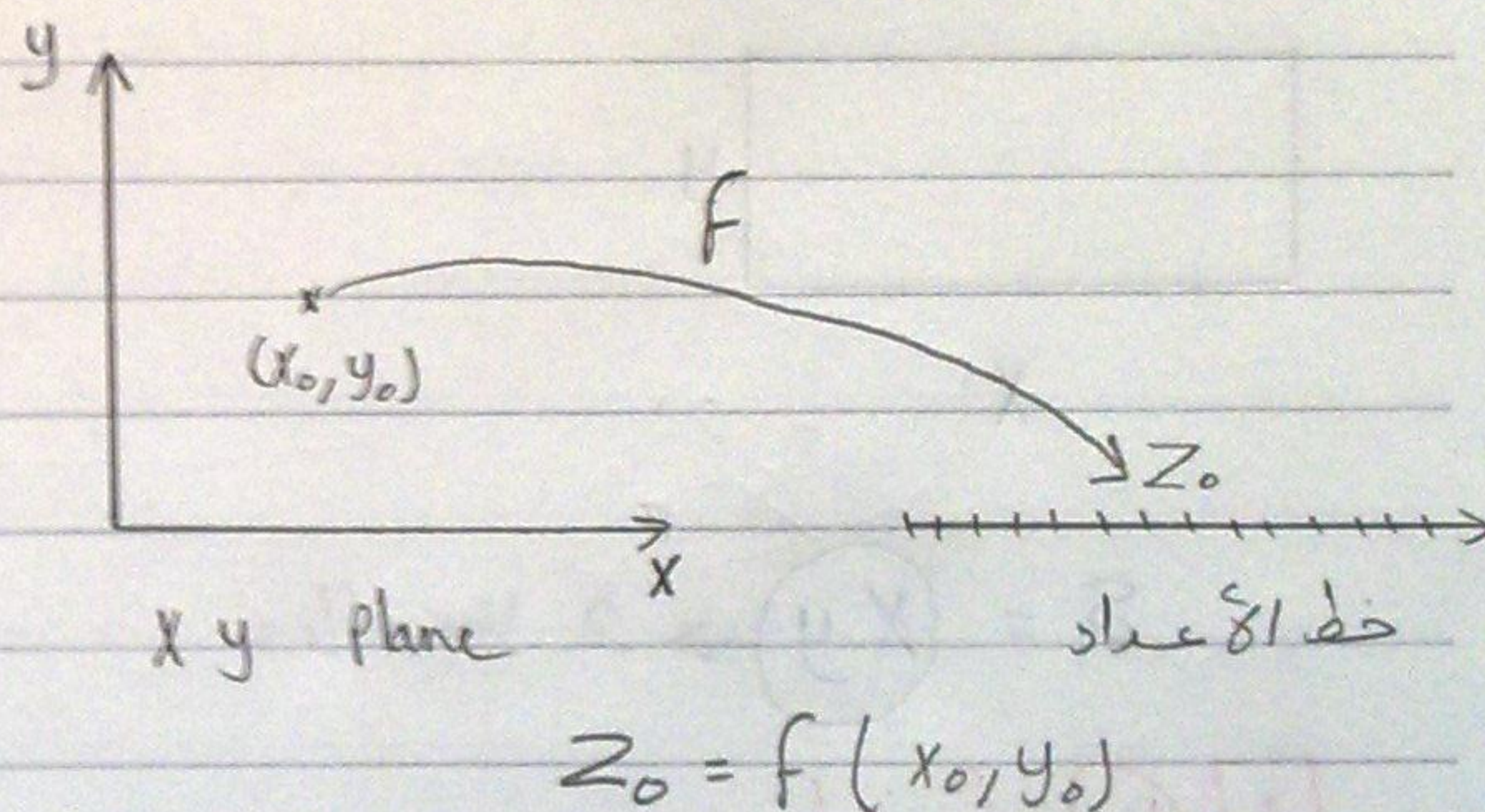


## 2 Domain & Range

\*  $y = f(x)$



\*  $z = f(x, y)$

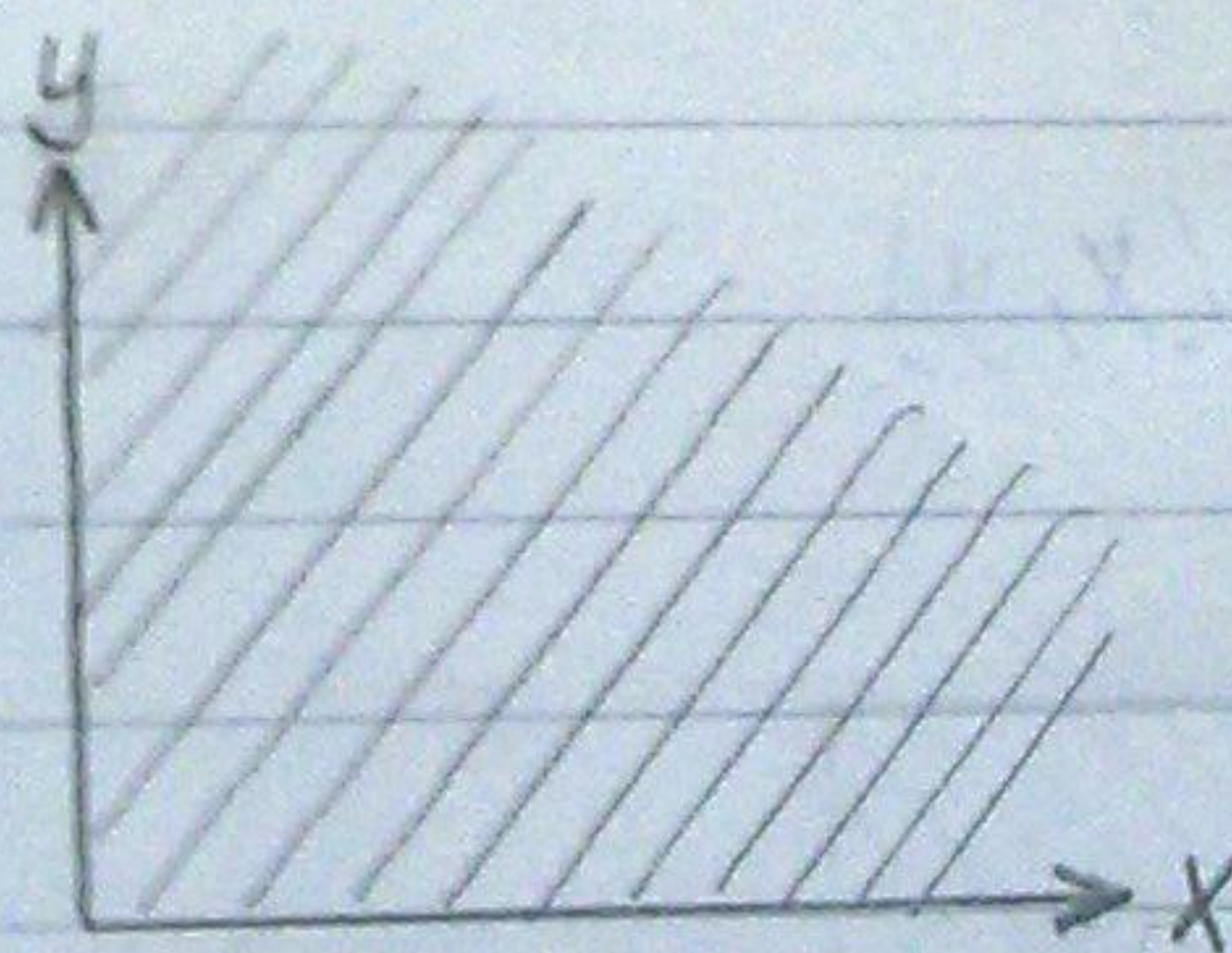


Ex:

Find and sketch the domain of the following functions :-

□  $f(x, y) = 2x - y$

Domain  $f = \mathbb{R}^2$





2  $f(x, y) = \sqrt{y+1} + \ln(x^2 - y)$

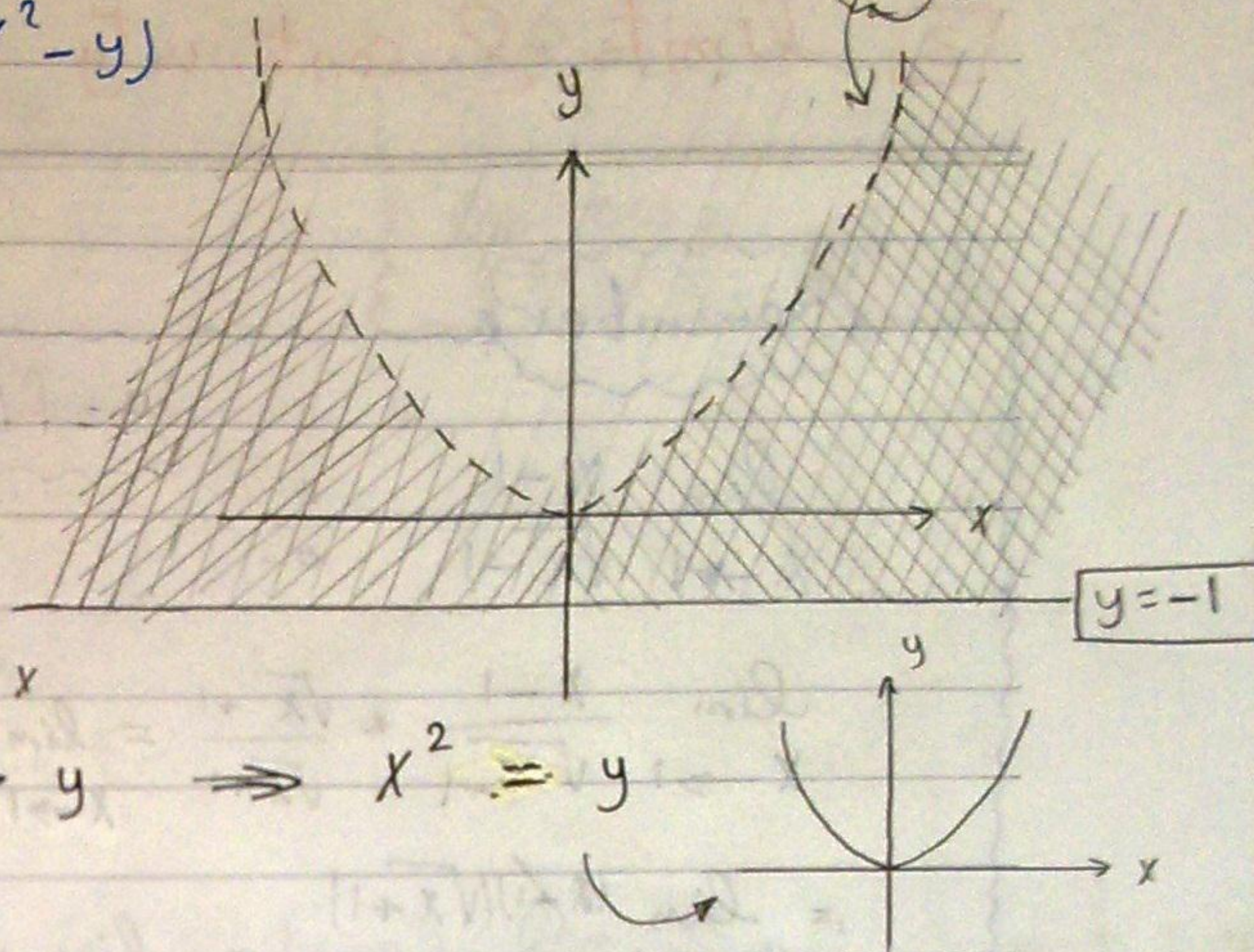
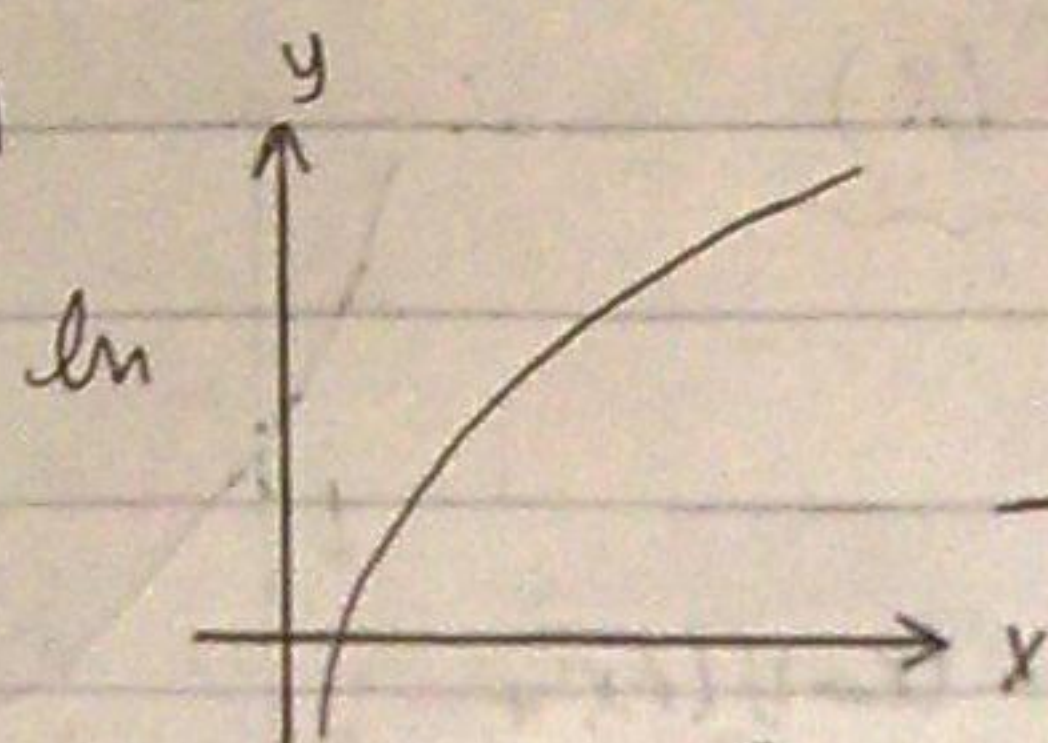
①  $(y+1) \geq 0$

$y \geq -1$

②  $\ln(x^2 - y)$

$x^2 - y > 0$

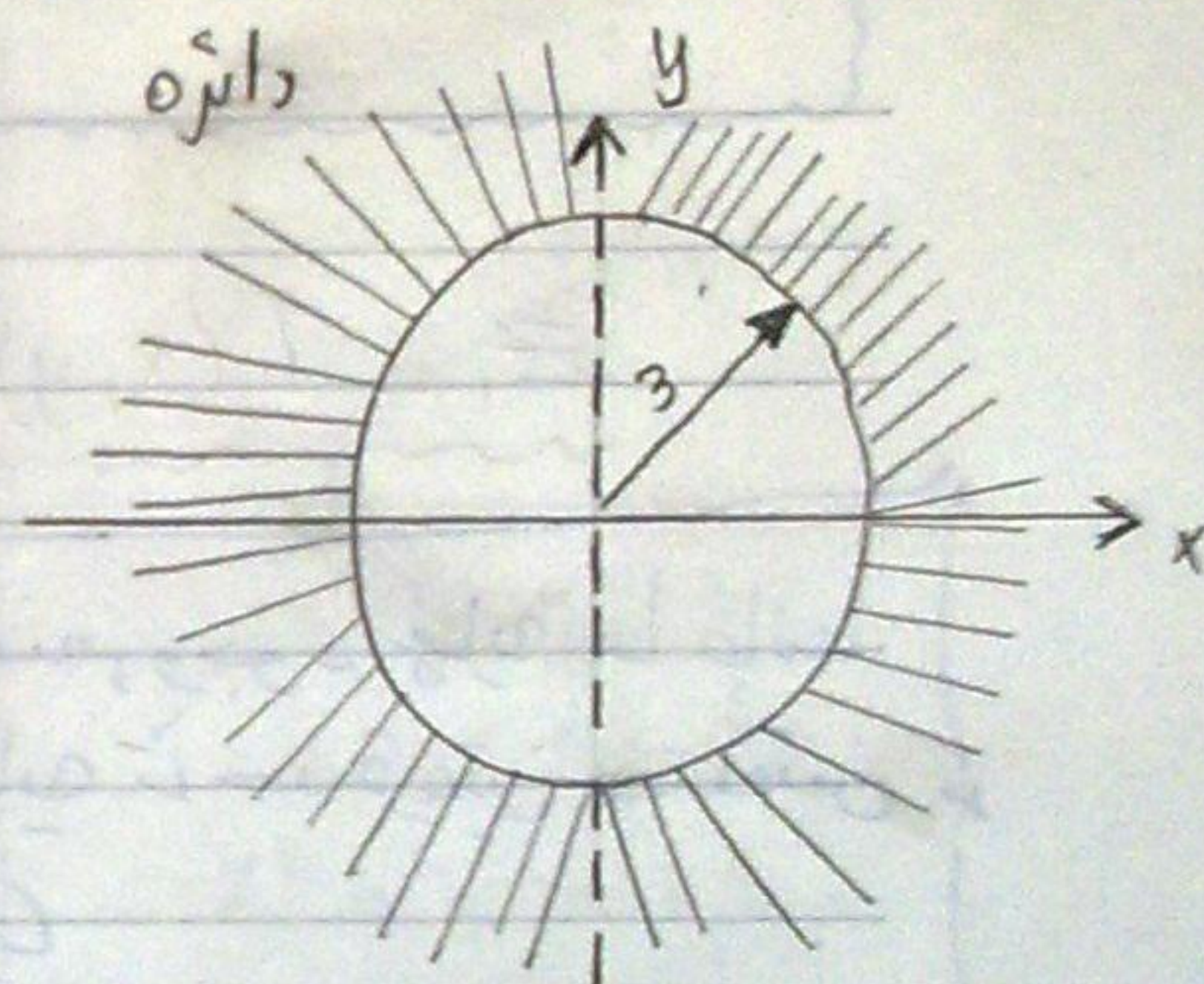
$\Rightarrow x^2 > y \Rightarrow x^2 = y$



3  $f(x, y) = \frac{\sqrt{x^2 + y^2 - 9}}{x}$

①  $x \neq 0$

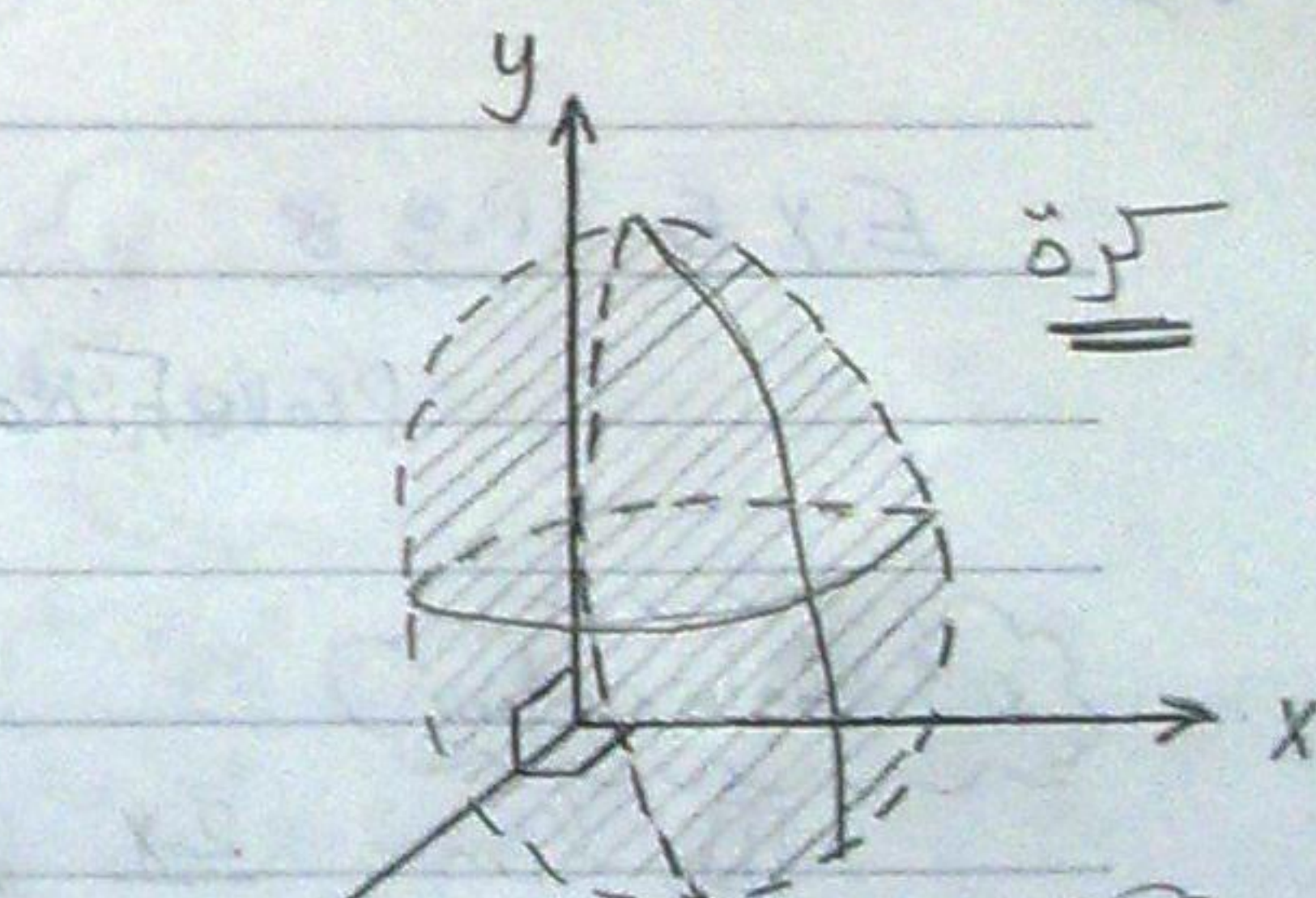
②  $x^2 + y^2 - 9 \geq 0 \Rightarrow x^2 + y^2 \geq 9$



4  $g(x, y, z) = \frac{x}{\sqrt{16 - x^2 - y^2 - z^2}}$

$16 - x^2 - y^2 - z^2 > 0$

$x^2 + y^2 + z^2 > 16$



5  $f(x, y) = \sin^{-1}(x - y)$

$-1 \leq x - y \leq 1$

\*  $x - y = 1$

\*  $x - y = -1$

