

PROGRAMM

a) PRODUCTION

b) GEN. EQ. WALRASIANO ~~BARROW-DIEU~~

c) CONTRACTTED ASYM. INFO

d) MECHANISM DESIGN

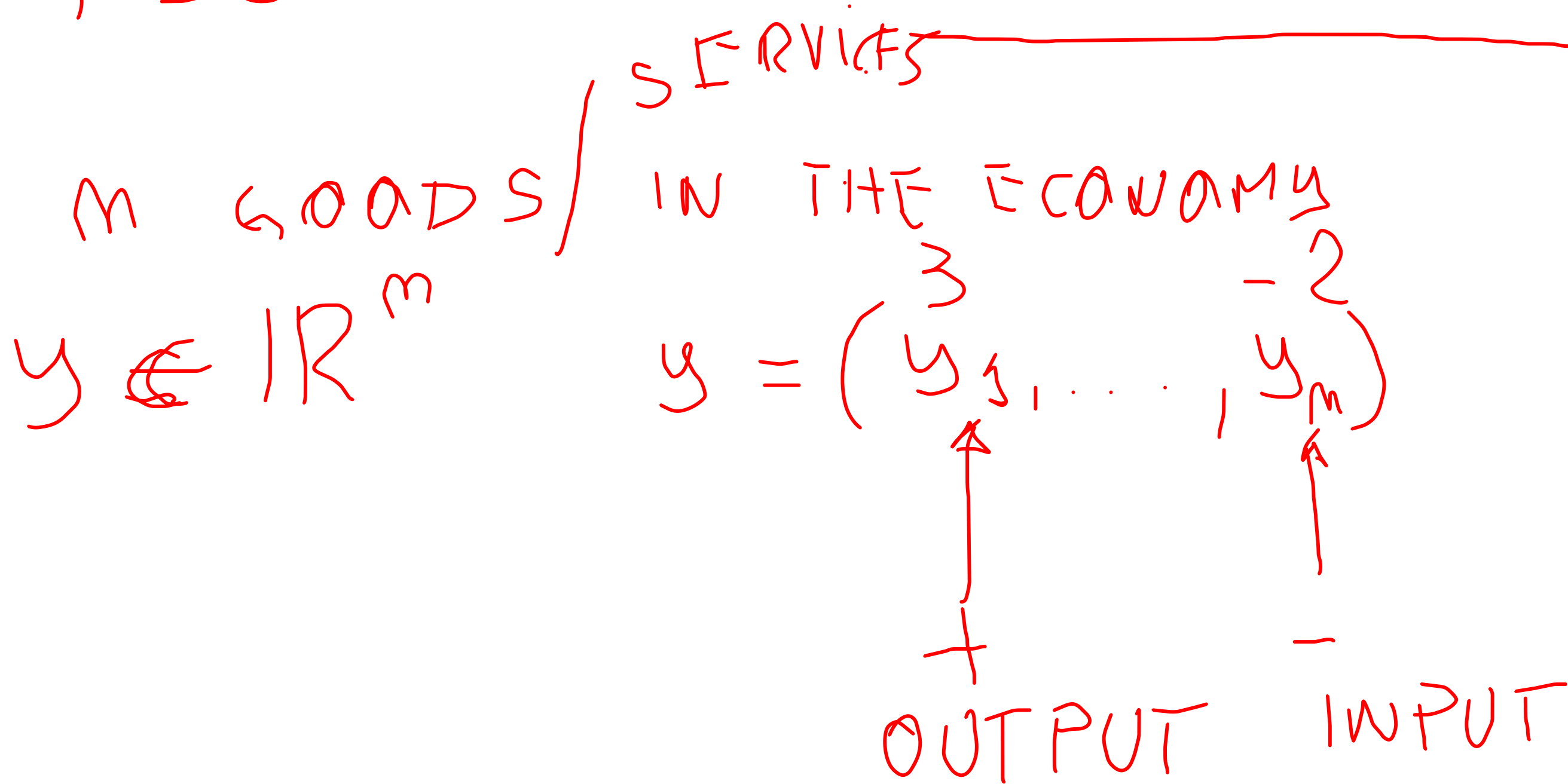
WILLIAM VICKRIES 1961

TESTI

VARIAN MICROECONOMIC
MAS COLELL - WHINSTON - STU

PRODUCTION

FEASIBILITY - TECHNOLOGY



EX

$$m = 3$$

$$y = (2, -1, -5)$$

$y \equiv$ PRODUCTION PLAN

$Y = \{ y \in \mathbb{R}^m \text{ FEASIBLE FOR A FIRM} \}$

$Y \subseteq \mathbb{R}^m \text{ normally } \subset \mathbb{R}^m$

EX

↓ OUTPUT, VECTOR OF INPUTS

$$y = \left(\overset{1}{z}, \overset{n-1}{x} \right)$$

↑ OUTPUT ↓ VECTOR OF INPUTS

$$x = (x_1, x_2, \dots, x_m)$$

$V(z) = \left\{ x \in \mathbb{R}^m \mid (z, x) \in Y \right\}$

THE SET OF INPUTS REQUIRED
TO PRODUCE AT LEAST z UNITS
OF THE OUTPUT

ISOPRODANT

$$Q(z) = \left\{ x \in \mathbb{R}^M \mid \begin{array}{l} x \in V(\frac{z}{\alpha}) \text{ AND} \\ x \notin V(z') \forall z' > z \end{array} \right\}$$

PRODUCTION FUNCTION (1 OUTPUT)

$$f(x) = \left\{ z \in \mathbb{R} : z = \underline{\text{MAX}} \text{ OUTPUT ASSOCIATED TO } x \text{ IN } Y \right\}$$

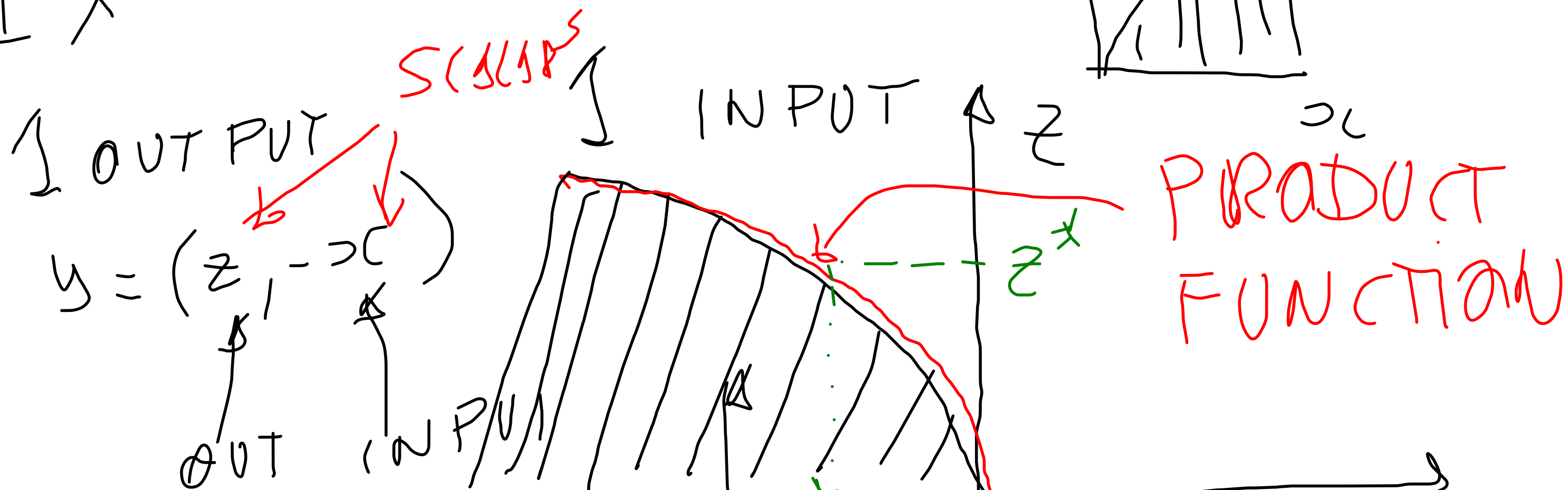
↑
VECTOR

$$y = (3, 1, -5)$$

$$y' = (2, 1, -5)$$

IF y IS FEASIBLE \Rightarrow ALSO y' IS FEASIBLE

EX



$$y = (z, x)$$

↑
OUTPUT

↑
INPUT

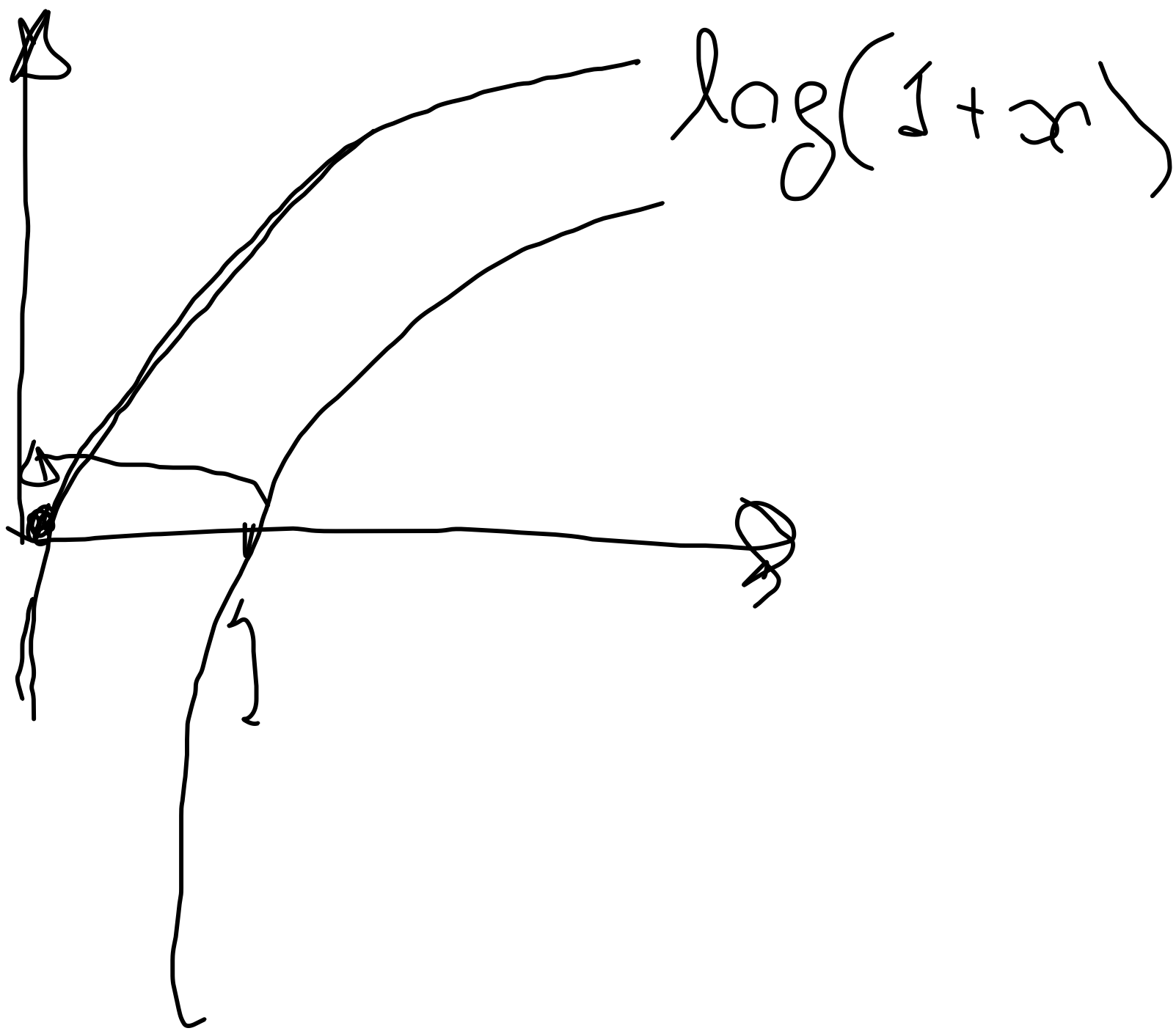
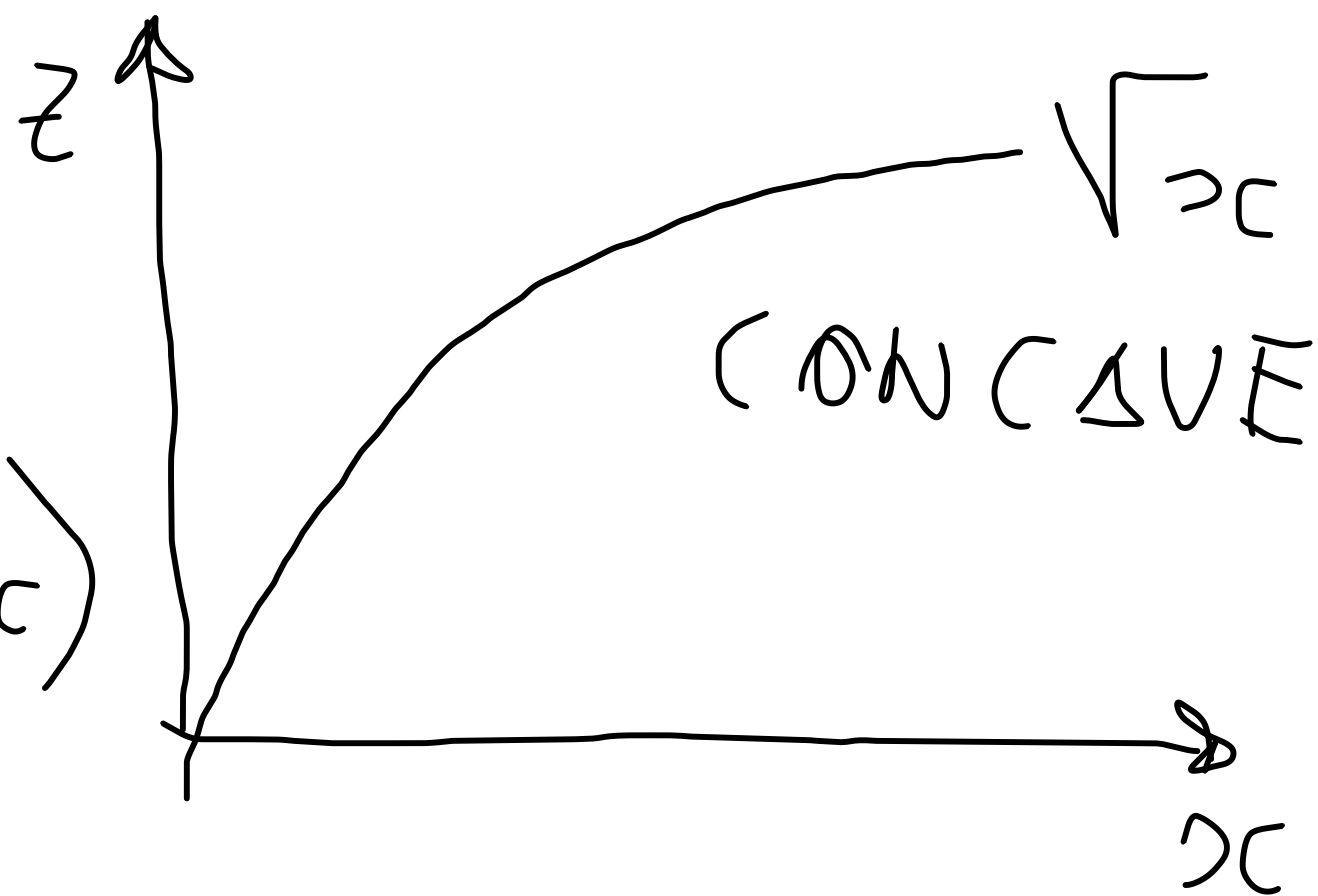
TECHNOLOGY = SET OF FEASIBLE PROD. PLANS

EX

$$z = f(x) = \sqrt{x}$$

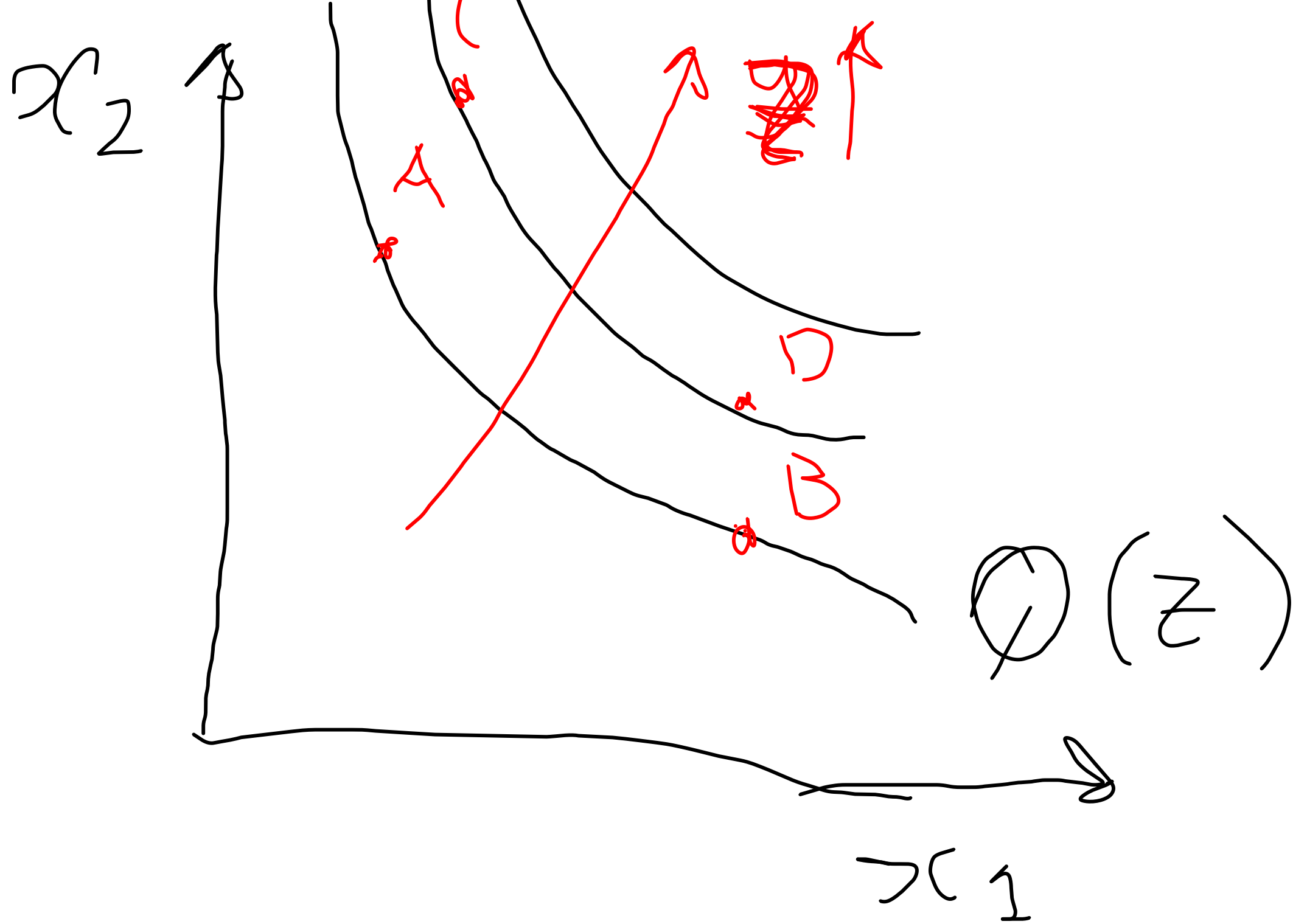
$$z = f(x) = \log(1+x)$$

$$z = \sqrt[3]{x} = x^{1/3}$$



EX

1 OUTPUT
2 INPUTS (z, x_1, x_2)

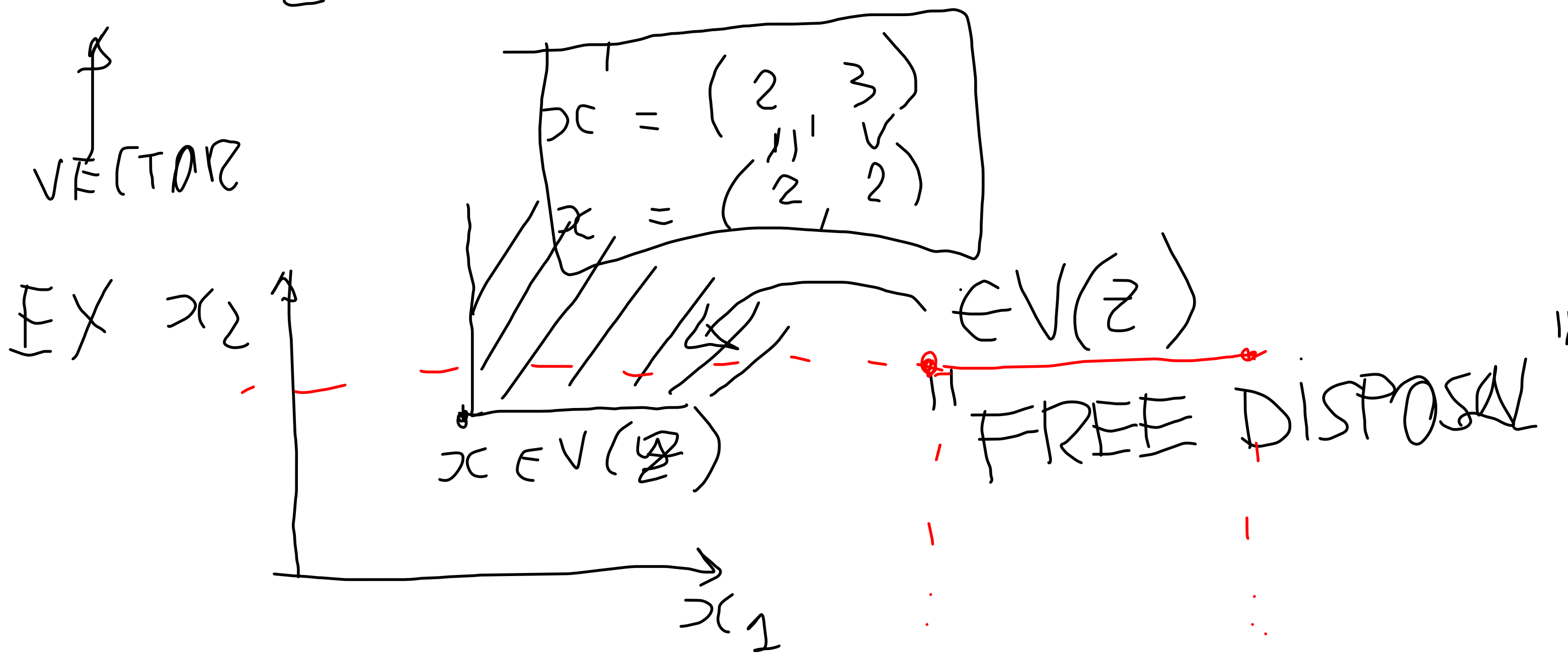


PROPERTIES OF THE TECHNOLOGY

उत्पाद

1) MONOTONICITY

IF $x \in V(z)$ AND $x' \geq x \implies x' \in V(z)$



CONVEXITY

↓ OUTPUT
CONVEX COMB.

$$x, x' \in V(z) \implies \underbrace{tx + (1-t)x'}_{x''} \in V(z)$$

EX

$$0 \leq t \leq 1$$

x''

$$x = (2, 5)$$

$$x' = (3, 7)$$

$$t = \frac{1}{3}$$

$$\implies x'' = \left(2 \cdot \frac{1}{3} + 3 \cdot \frac{2}{3}, 5 \cdot \frac{1}{3} + 7 \cdot \frac{2}{3} \right)$$

x_1

$x \in V(z)$

$x'' \in V(z)$

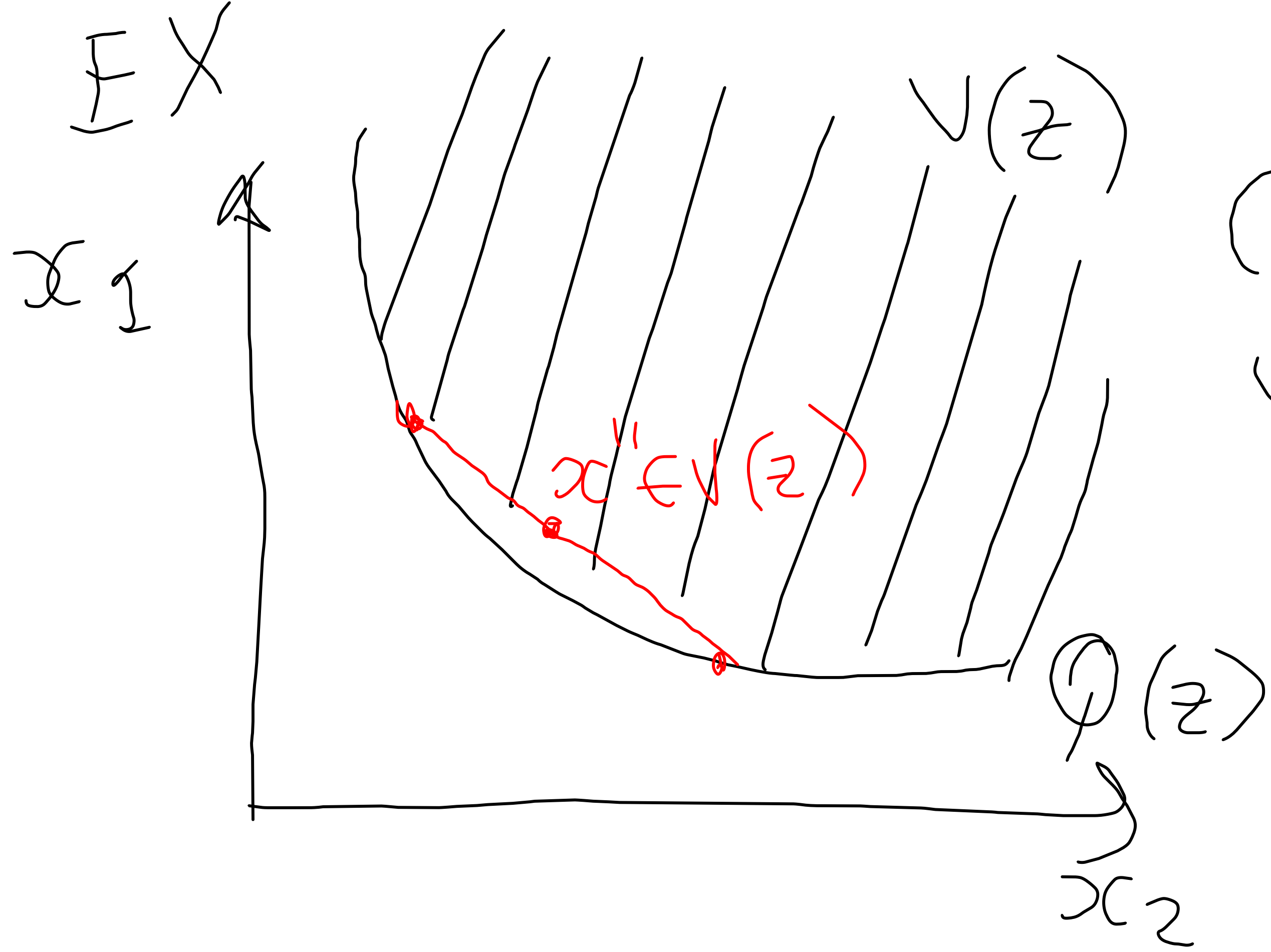
$x \in V(z)$

$$\left(\frac{8}{3}, \frac{19}{3} \right)$$

THE SET

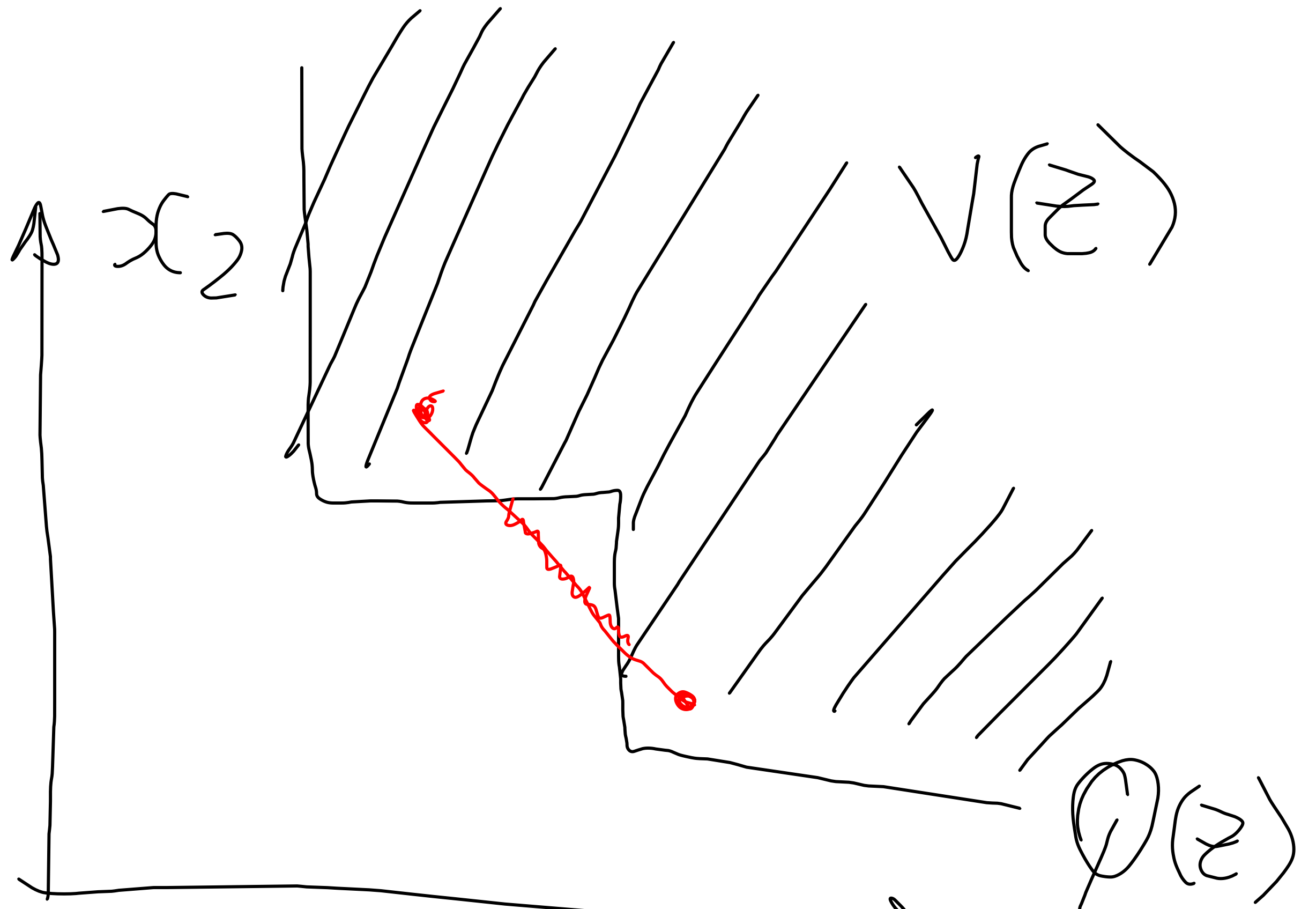
OF ALL POSSIBLE CONVEX COMB x_2





CONVEXITY?
YES

EX

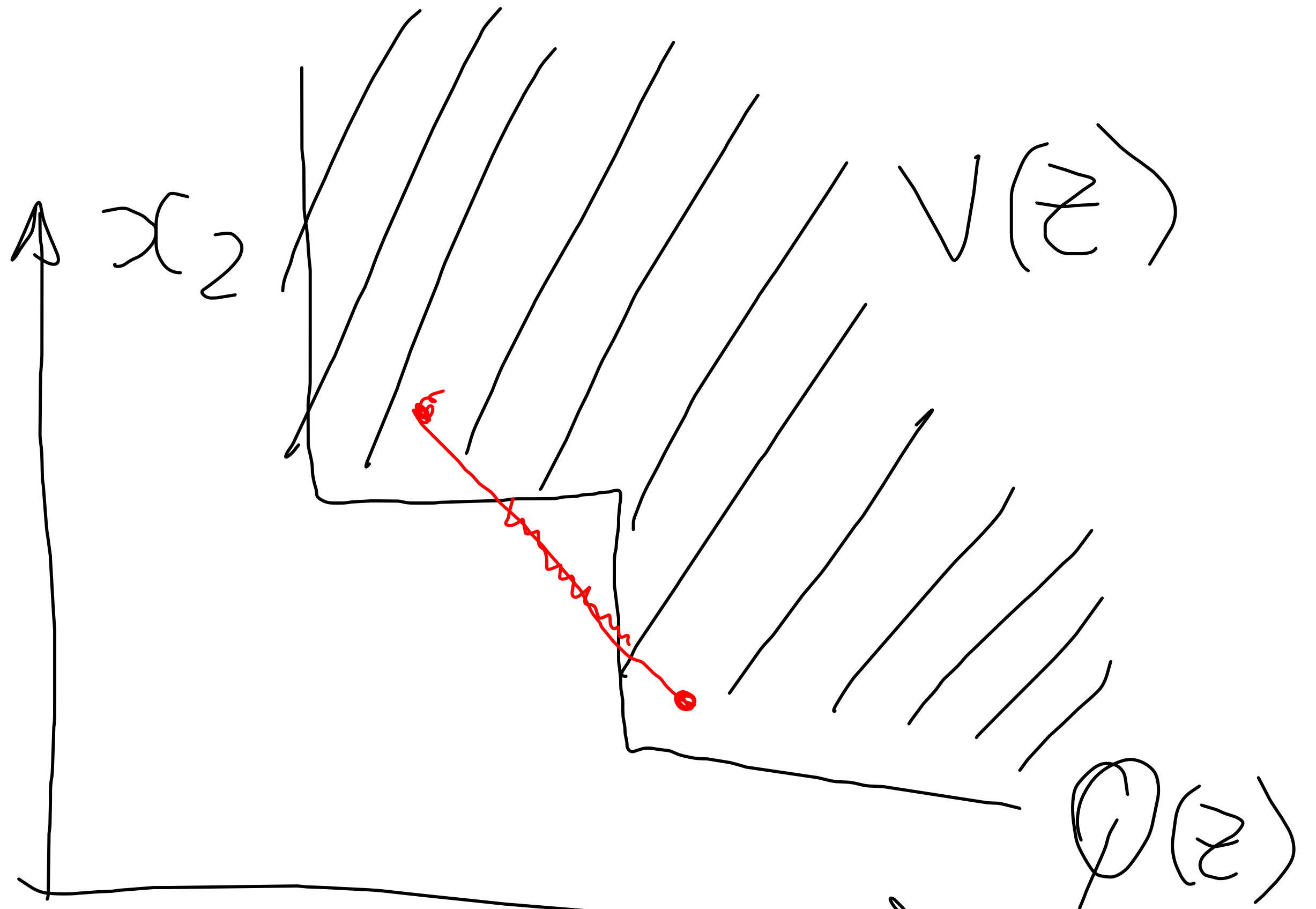


IS THIS CONVEX?

NO

~~NO~~

EX



IS THIS CONVEX?

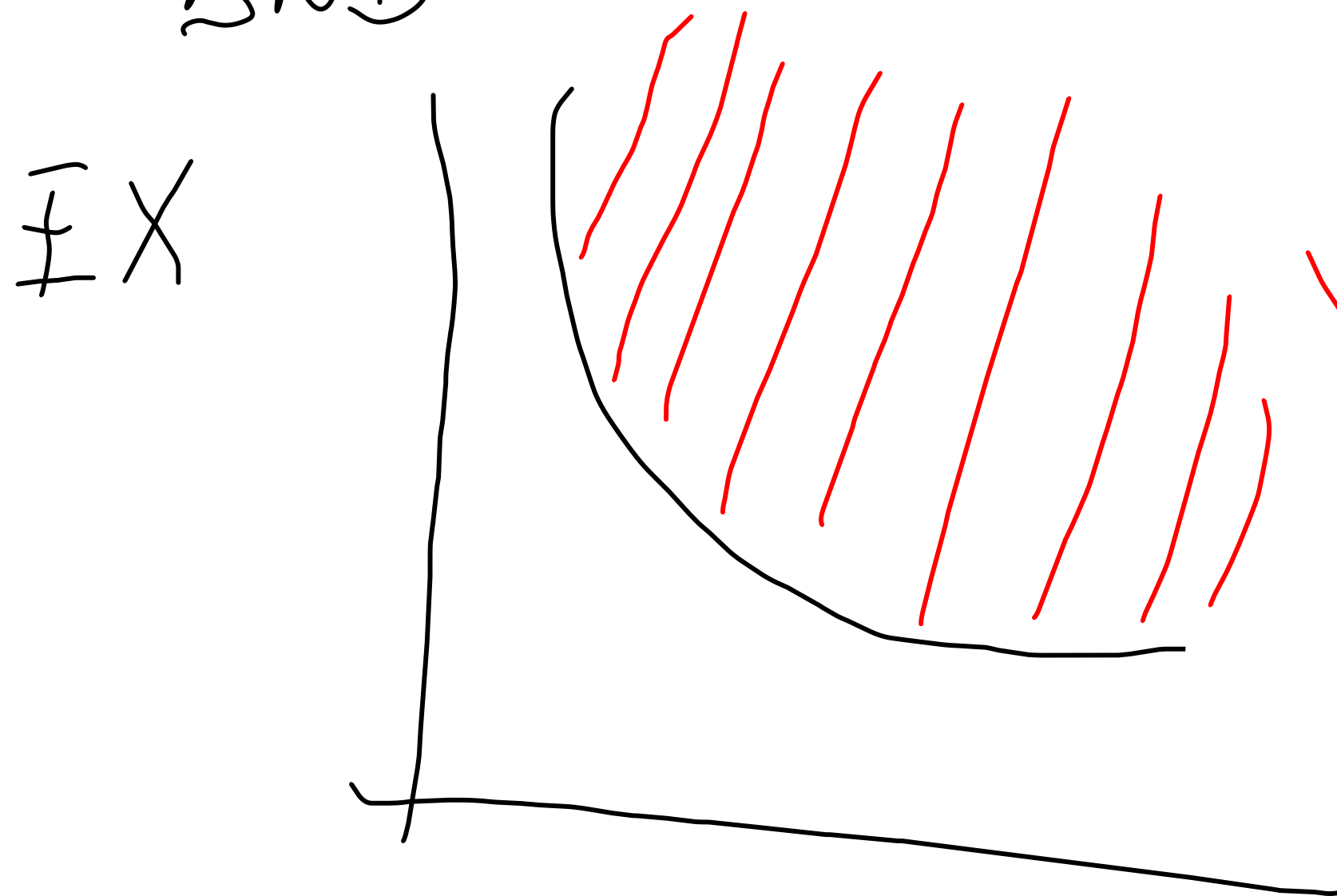
NO

~~CC~~

REGULAR TECHNOLOGY

$V(z)$ IS REGULAR IF IT IS CLOSED

AND NOW EMPTY



$V(z)$

NOT REGULAR
↑
DOES NOT
INCLUDE THE CURVE

RETURNS OF SCALE (1 OUTPUT)

DEF A TECHNOLOGY EXHIBITS

1) CONSTANT RETURNS OF SCALE

1) IF $y \in Y \Rightarrow$ ALSO $(t)y \in Y \quad t \geq 0$



EX

1 OUTPUT

1 INPUT

2) IF $z \in V(x) \Rightarrow (tz) \in V(tx) \quad \forall t > 0$

3) $f(tx) = tf(x) \quad \forall t > 0$