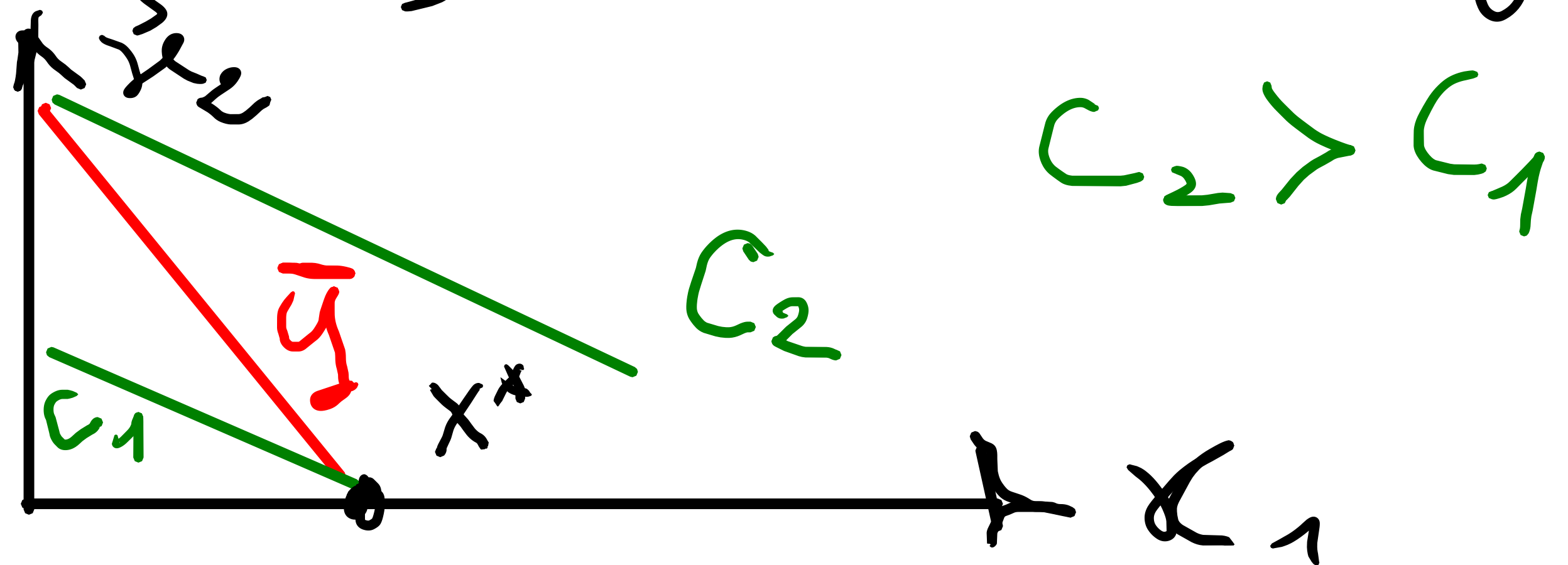


COST MINIMISATION

① if $|TRS| = \frac{MP_1}{MP_2} \neq \frac{w_1}{w_2}$ at $x_1 > 0, x_2 > 0$
 then (x_1, x_2) is not cost minimising

② if $|TRS| = \frac{MP_1}{MP_2} > \frac{w_1}{w_2}$ at $(x_1, 0)$ $x_1 > 0$
 then $(x_1, 0)$ is cost minimising
 at w_1, w_2

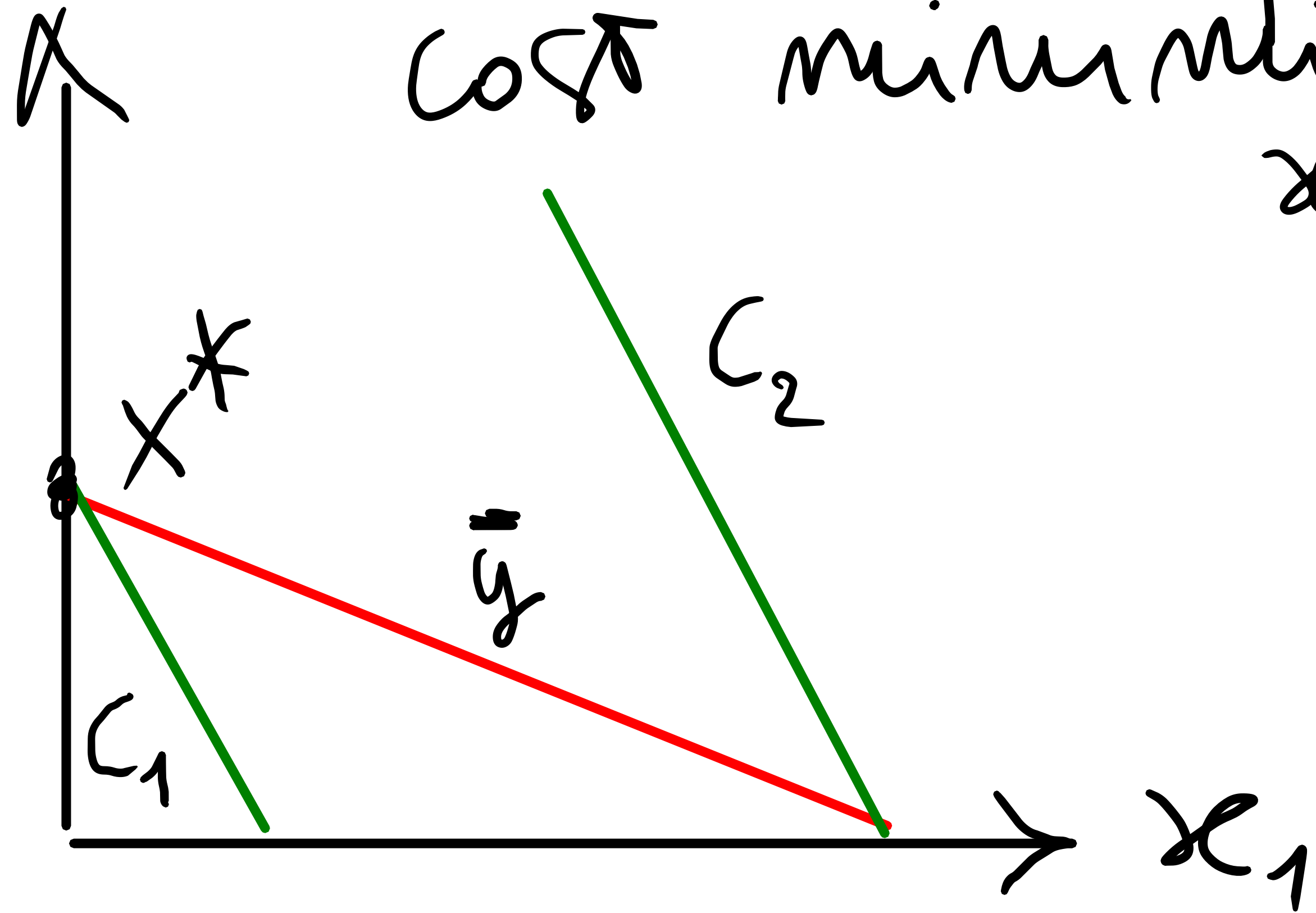
In this example $y = ax_1 + bx_2$ $|TRS| = a/b > w_1 / w_2$



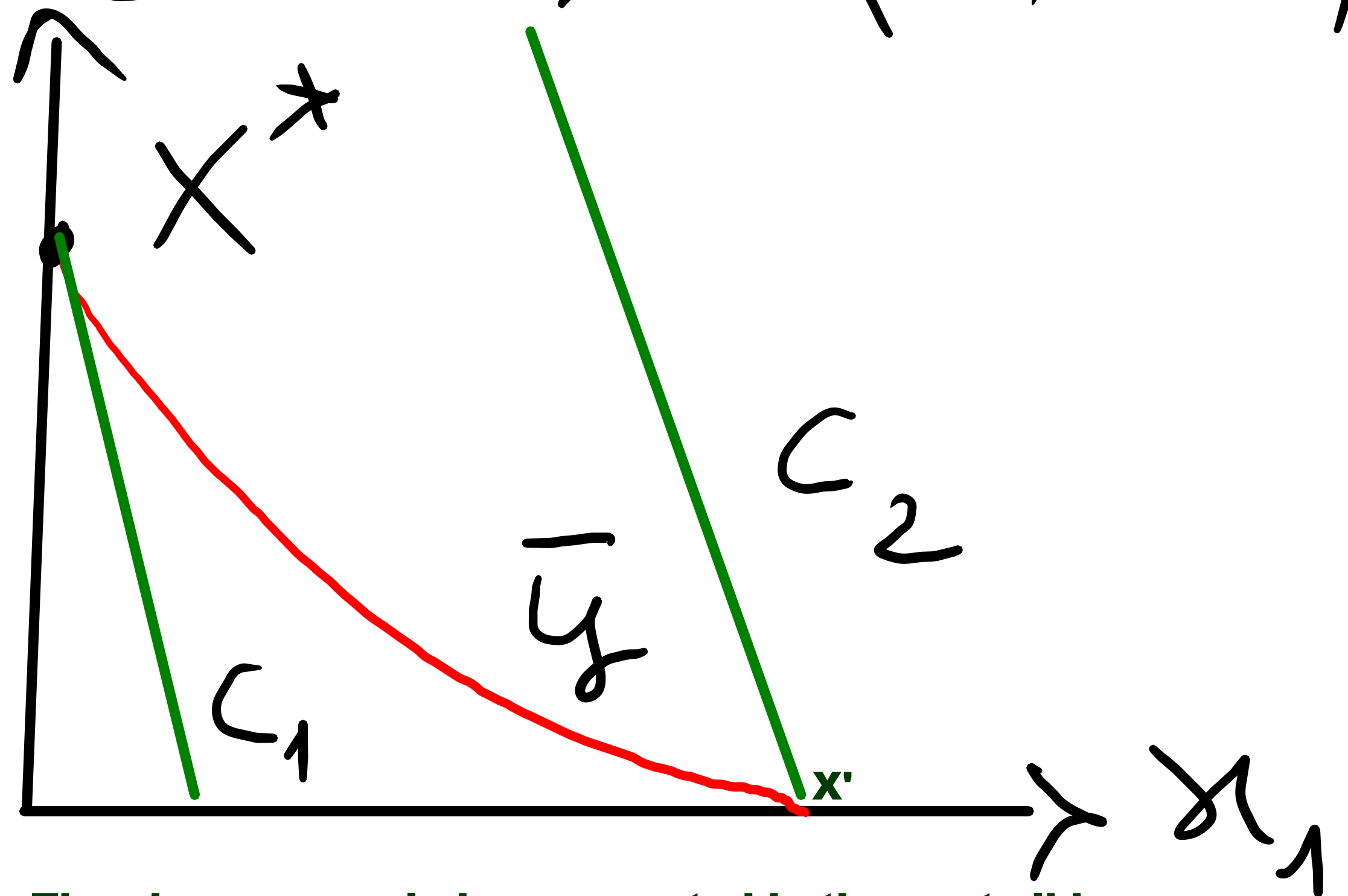
③ if $|TRS| = \frac{MP_1}{MP_2} < \frac{w_1}{w_2}$ at $(0, x_2)$

x_2 then technique $(0, x_2)$ is
cost minimising x_2

$$X^* = (0, x_2)$$



In the above example $y = ax_1 + bx_2$ $|TRS| = a/b < w_1 / w_2$



The above example is commented in the next slide

$$y = f(x_1, x_2) = (1 + x_1)(1 + x_2)$$

$$MP_1 = (1 + x_2)$$

$$MP_2 = 1 + x_1$$

$$|TRS| = \frac{1 + x_2}{1 + x_1}$$

$$|TRS(x^*)| = 1 + x_2 < w_1 / w_2 \quad \text{X}^* \text{ is optimum cost-minimising, because } x_1 = 0$$

$$x' = (x_1, 0) \quad |TRS(x')| = \frac{1}{1 + x_1} < w_1 / w_2, \text{ X' is not optimum because } x_1 > 0$$

COST FUNCTION $C(y)$

W_1, W_2 constant $C(y)$ = minimum cost
for producing y
at W_1, W_2

$(\bar{x}_1, \bar{x}_2)$ is cost minimising for $y=1$

$$C(1) = W_1 \bar{x}_1 + W_2 \bar{x}_2$$

① $f(\lambda x_1, \lambda x_2) = \lambda f(x_1, x_2)$ CONSTANT RETURNS
TO SCALE

$$AC(y) = \frac{C(y)}{y} = C(1) \frac{\bar{x}_2}{\bar{x}_1} = \frac{y \bar{x}_2}{y \bar{x}_1}$$

if $f(x_1, x_2)$ is a constant returns
to scale prod. function:

$$AC(y) = \text{constant}$$

② $f(\lambda x_1, \lambda x_2) > \lambda f(x_1, x_2) \quad \lambda > 1$
INCREASING RETURNS TO SCALE

$$C(y) < y \cdot C(1)$$

$AC(y) = \frac{C(y)}{y}$ is decreasing function of y

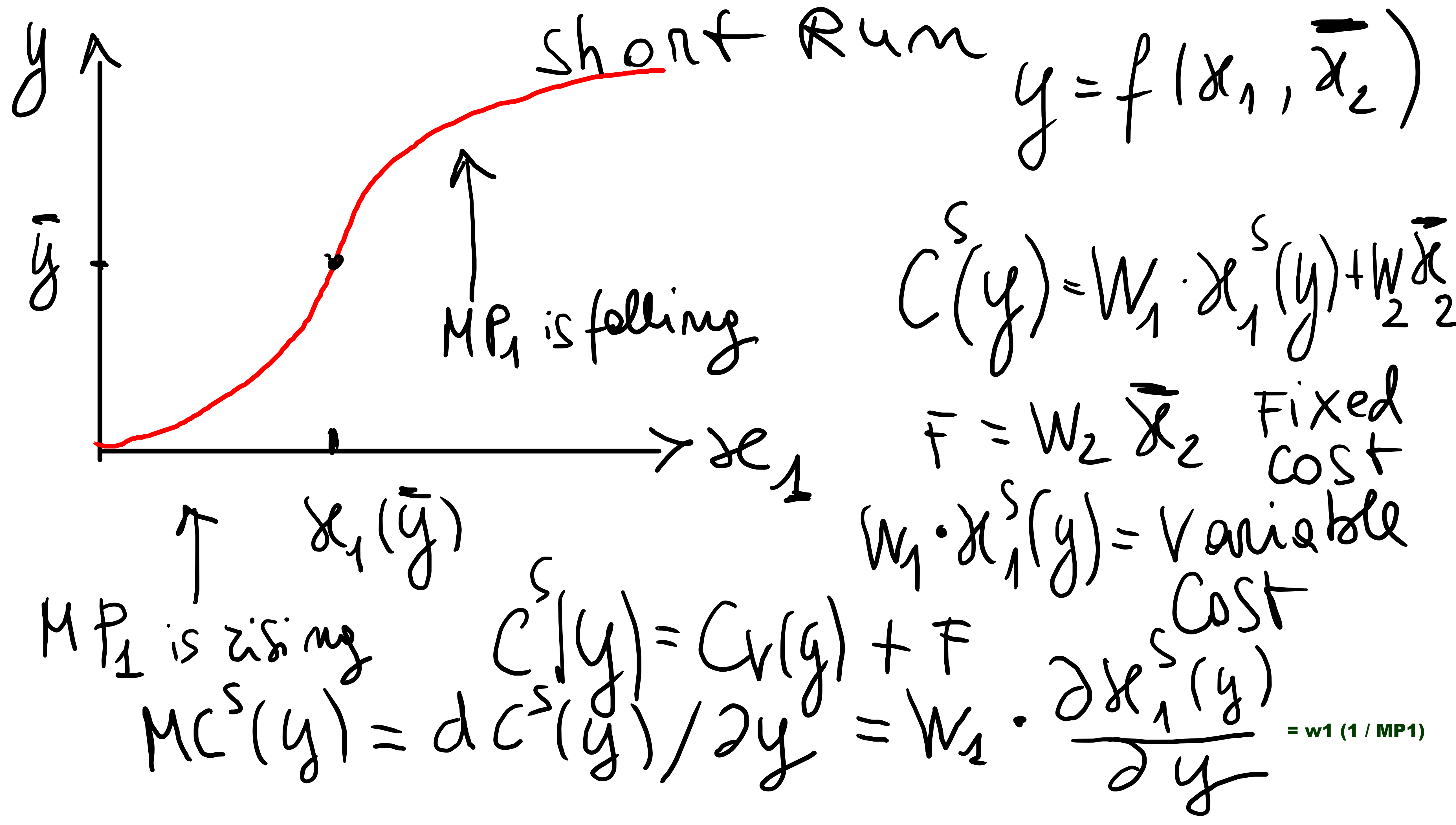
③

Decreasing Returns to Scale

$$f(\lambda x_1, \lambda x_2) < \lambda f(x_1, x_2)$$

$$C(y) > y \cdot C(1)$$

$A(y) = \frac{C(y)}{y}$ is increasing function of y



$$MP_1 = \frac{\partial y}{\partial x_1}$$

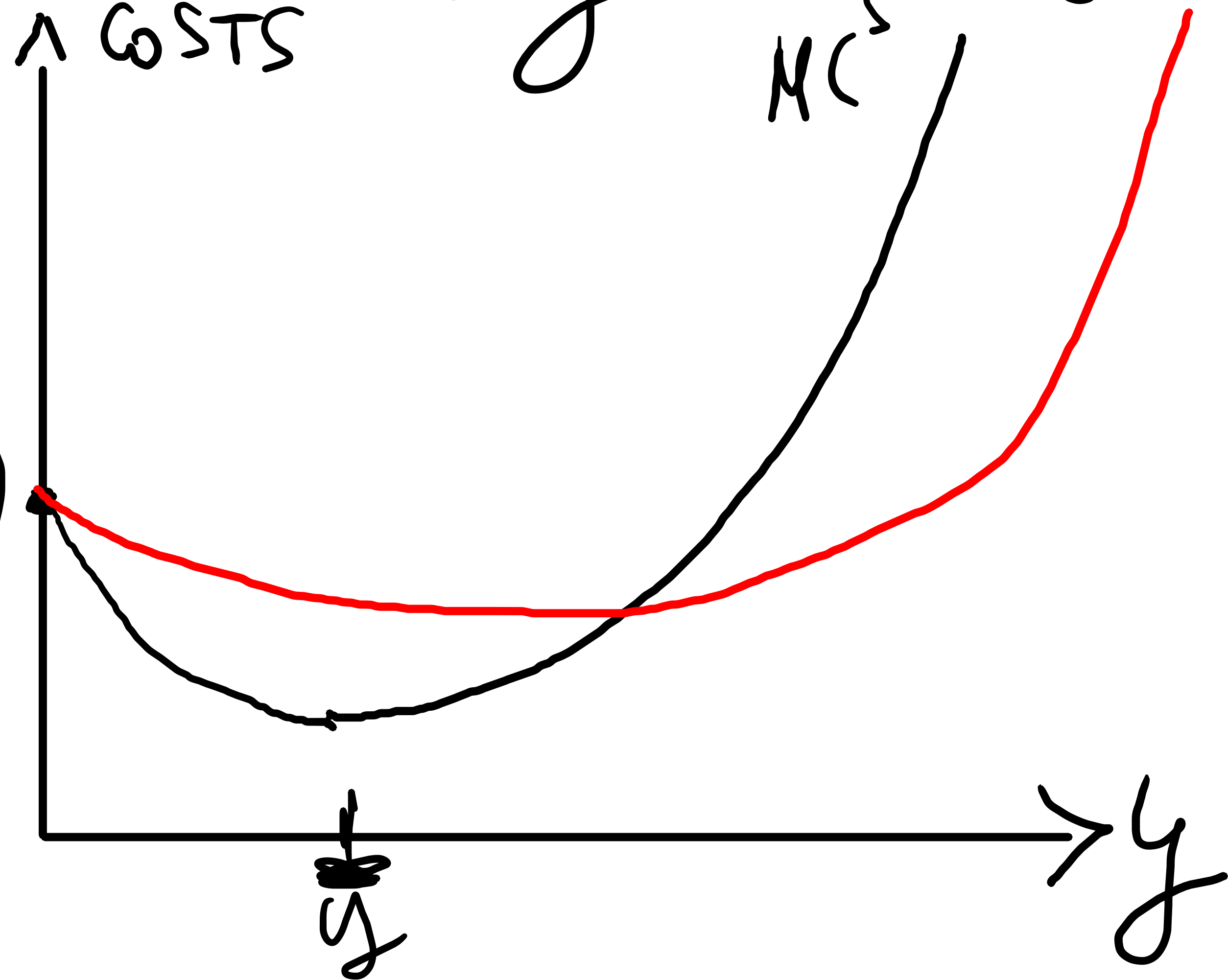
$$\frac{\partial x_1}{\partial y} = \frac{1}{MP_1}$$

$$\Delta y = 1 \quad MC^S(y) = W_1 \cdot \frac{1}{MP_1}$$

$$MC^S(0) = \frac{C_v(1) + F - (C_v(0) - F)}{1} \quad MC(0)$$

$$MC^S(0) = C_v(1) = AVC(1)$$

↑ COSTS



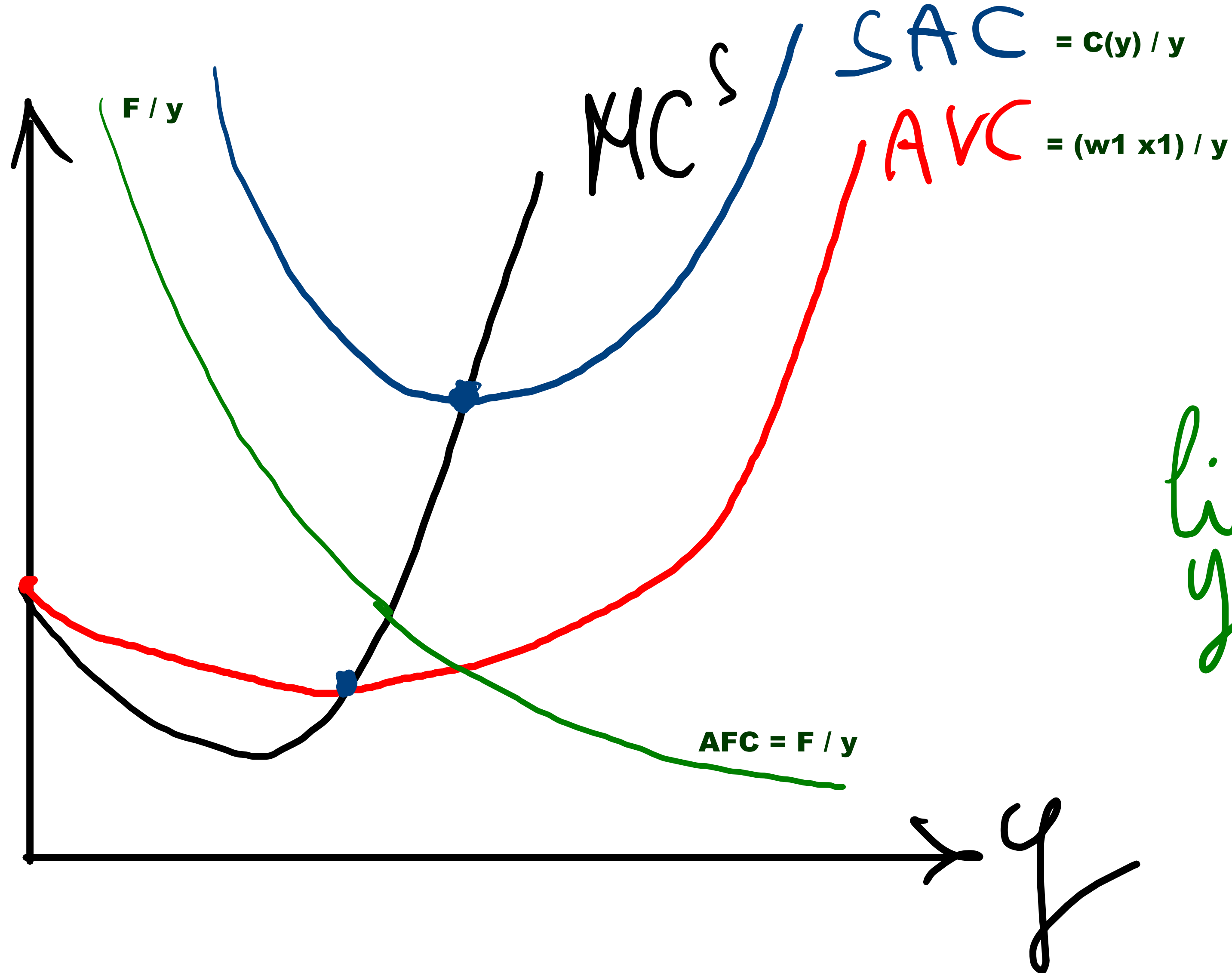
if $MC(y) < AVC(y) \rightarrow \frac{\partial AVC}{\partial y} < 0$

if $MC(y) = AVC(y) \rightarrow \frac{\partial AVC}{\partial y} = 0$

if $MC(y) > AVC(y) \rightarrow \frac{\partial AVC}{\partial y} > 0$

curve $MC^s(y)$ intersects curve $AVC(y)$
at its minimum

Costs



$$\frac{F}{y} = AFC$$

AVERAGE FIXED COST

$$\lim_{y \rightarrow \infty} AFC = 0$$

$$\lim_{y \rightarrow 0} AFC = \infty$$

$$SAC = AVC + AFC$$

THE short-run $MC(y)$ CURVE INTERSECTS THE AVC CURVE AND THE SAC CURVE AT THEIR MINIMUM

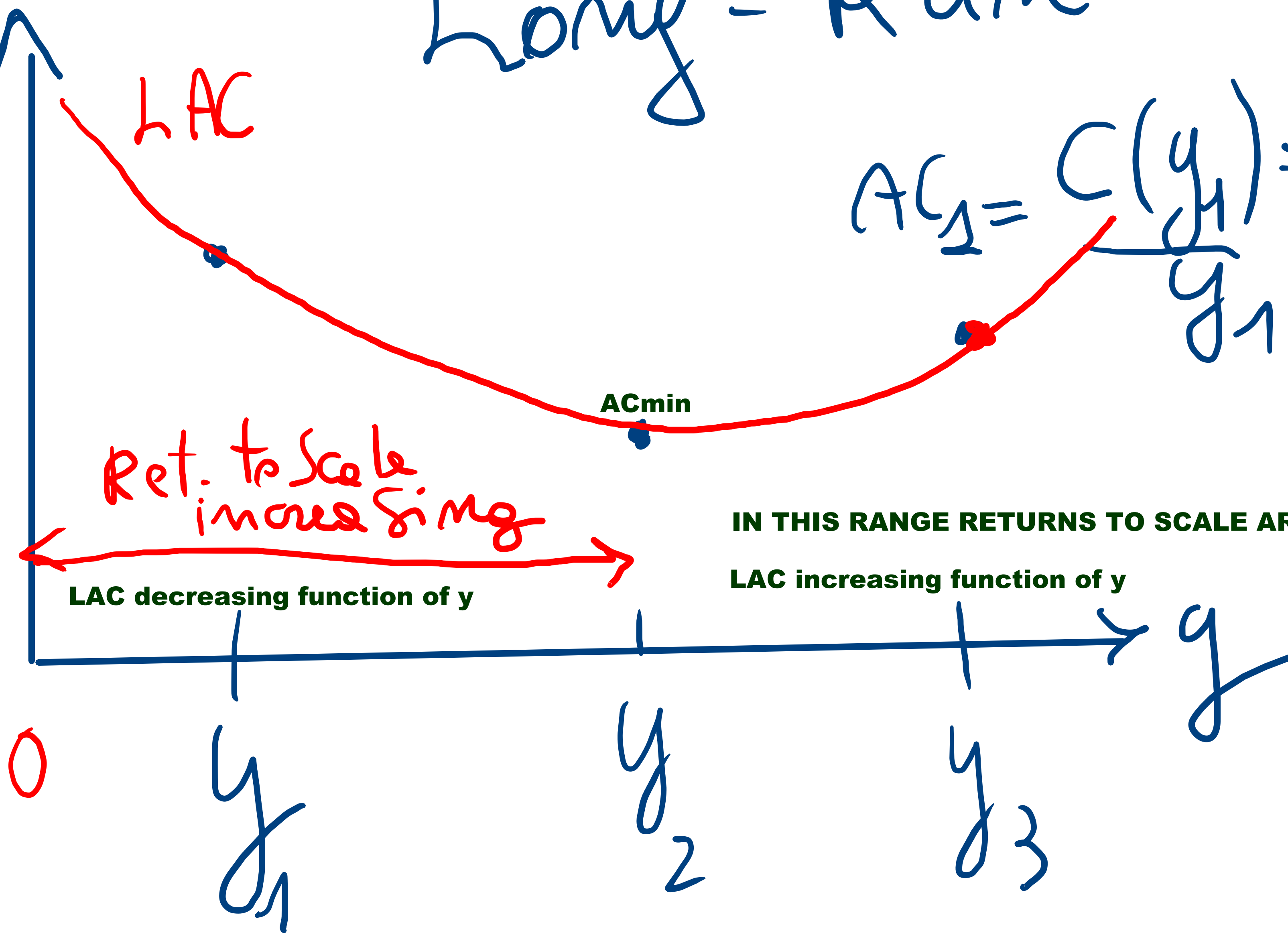
Costs

Long-Run

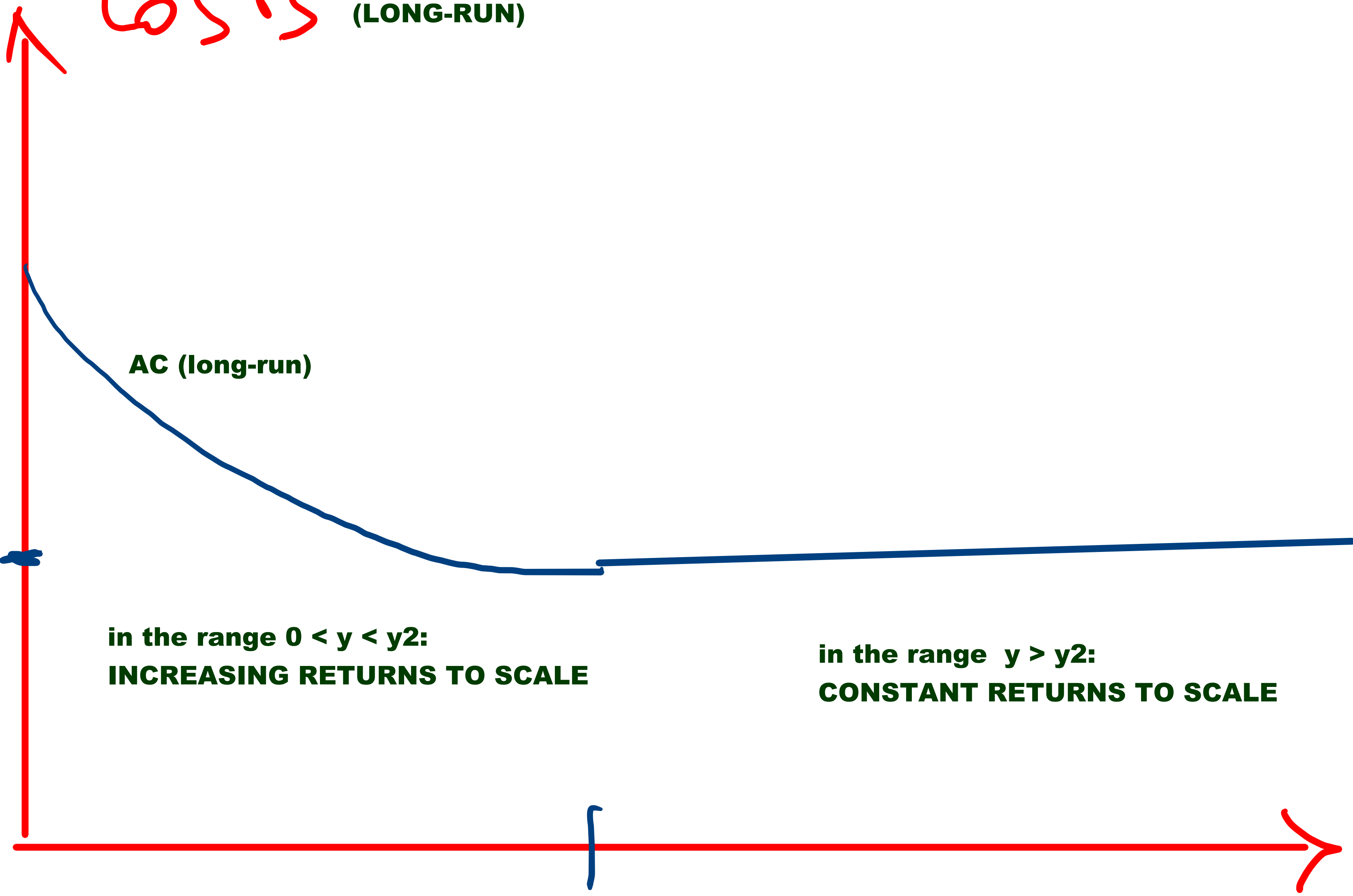
W_1 W_2

$$AC_1 = \frac{C(y_1)}{y_1} = \frac{x_1^*(y_1)W_1 + x_2^*(y_1)W_2}{y_1}$$

ACmin = minimum average cost



Costs (LONG-RUN)



AC_{MIN}

in the range $0 < y < y_2$:
INCREASING RETURNS TO SCALE

in the range $y > y_2$:
CONSTANT RETURNS TO SCALE

y_2

y

p