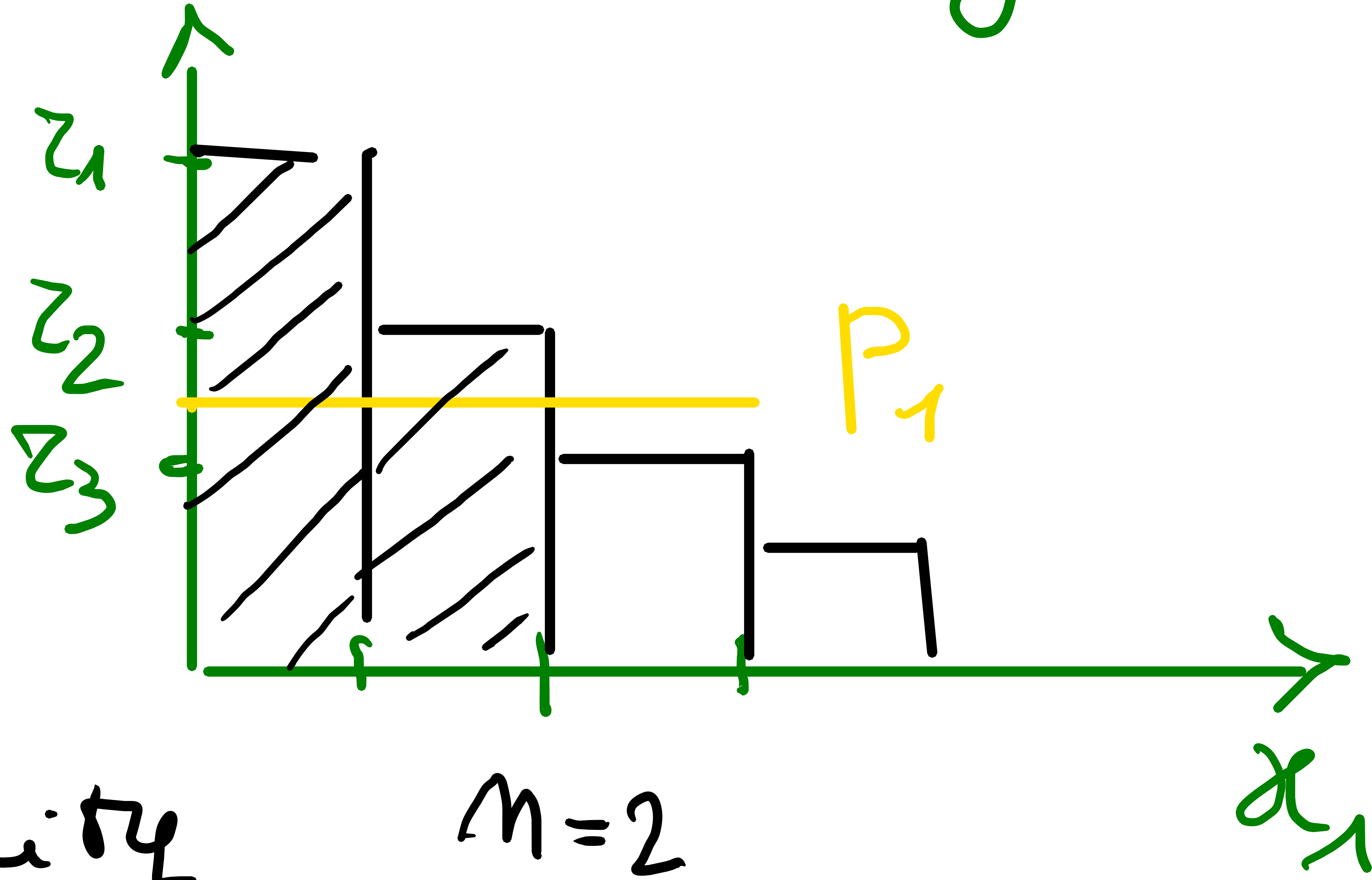
$u(x_1, x_2) = v(x_1) + x_2$ quasi-linear utility

x_1 is discrete $\quad v(0) = 0$

$r_1 = v(1) - v(0) = v(1)$

$r_2 = v(2) - v(1)$



$n = 2$

GROSS consumer surplus: total contribution to utility from consuming $x_1 = 2$ $= r_1 + r_2 = v(2)$

= maximum expenditure consumer is willing to make to buy $x_1 = 2$

$x_1(p_1) = m = 2$ then $p_2 = 1$

Net consumer surplus $= V(2) - 2p_1$

$2p_1 = x_1 p_1 =$ number of units of x_2 cons. can buy with $x_1 p_1$

$=$ additional utility the consumer receives from consuming additional $x_1 p_1$ units of x_2

$V(2) - 2p_1 =$ net contribution to utility from $x_1(p_1) = 2$

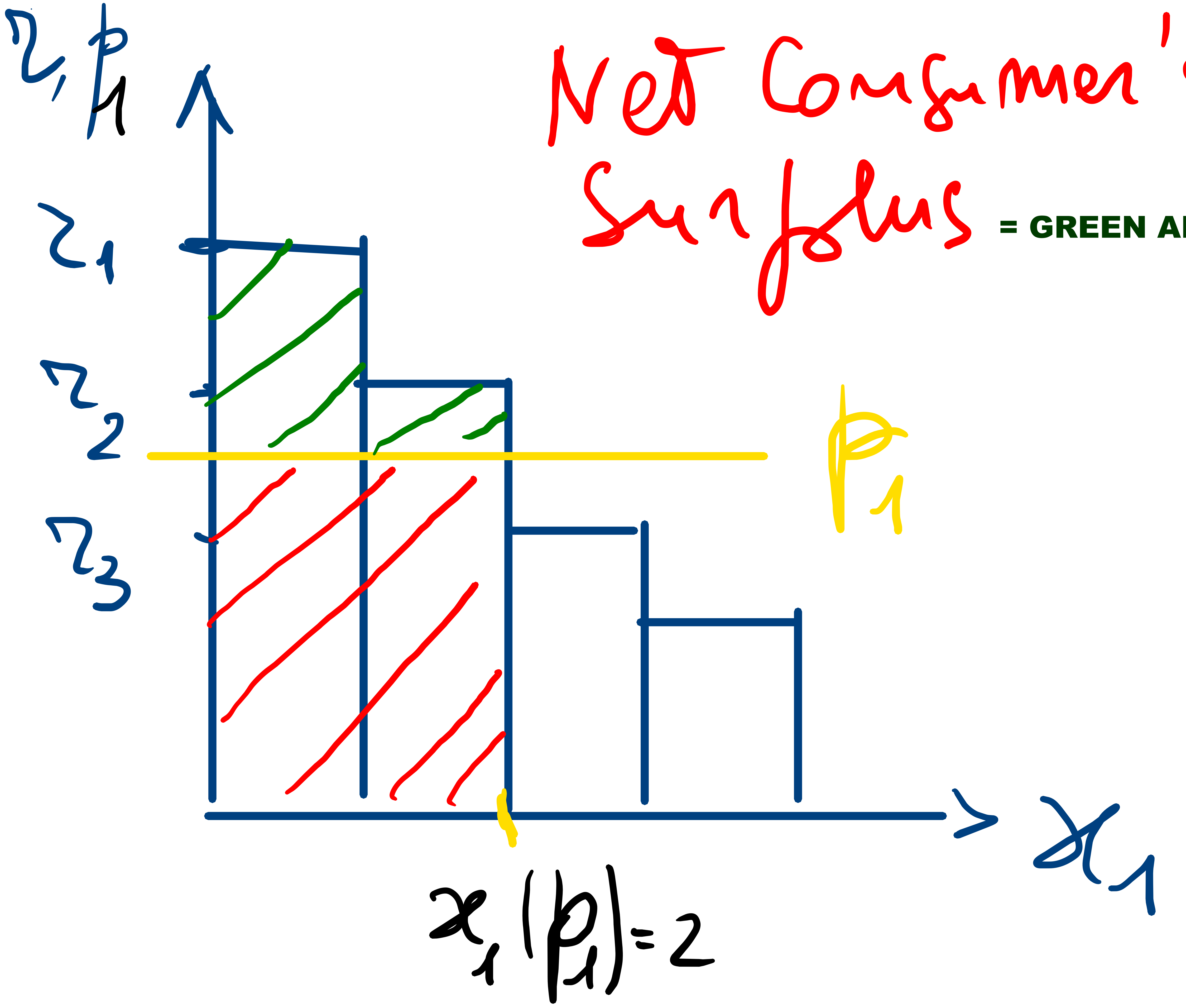
NET CONSUMER'S SURPUS = GROSS CONSUMER SURPLUS --- EXPENDITURE =

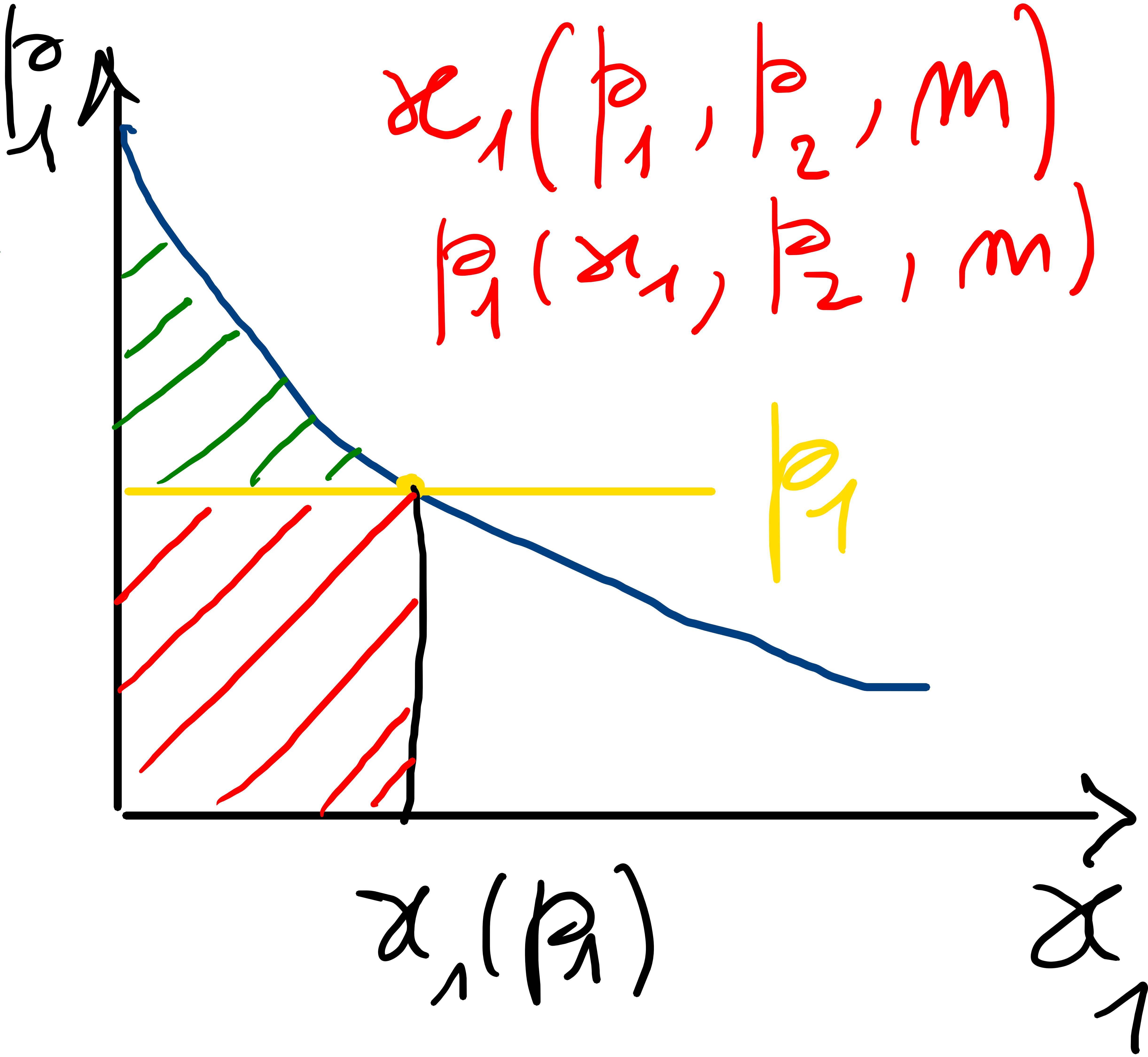
[CONTRIBIUTION TO UTILITY FROM BUYING $x1$ UNITS OF GOOD 1 AT PRICE $p1$ = GROSS CONSUMER'S SURPLUS]

MINUS

[CONTRIBUTION TO UTILITY FROM SPENDING MONEY $p1x1$ FOR GOOD 2, RATHER THAN FOR GOOD 1]

Net Consumer's Surplus = GREEN AREA





pref. quasilinear

AN EQUIVALENT DEFINITION:

net consumer's surplus:

max. expenditure consumer is willing to make for buying $x_1 = 2$

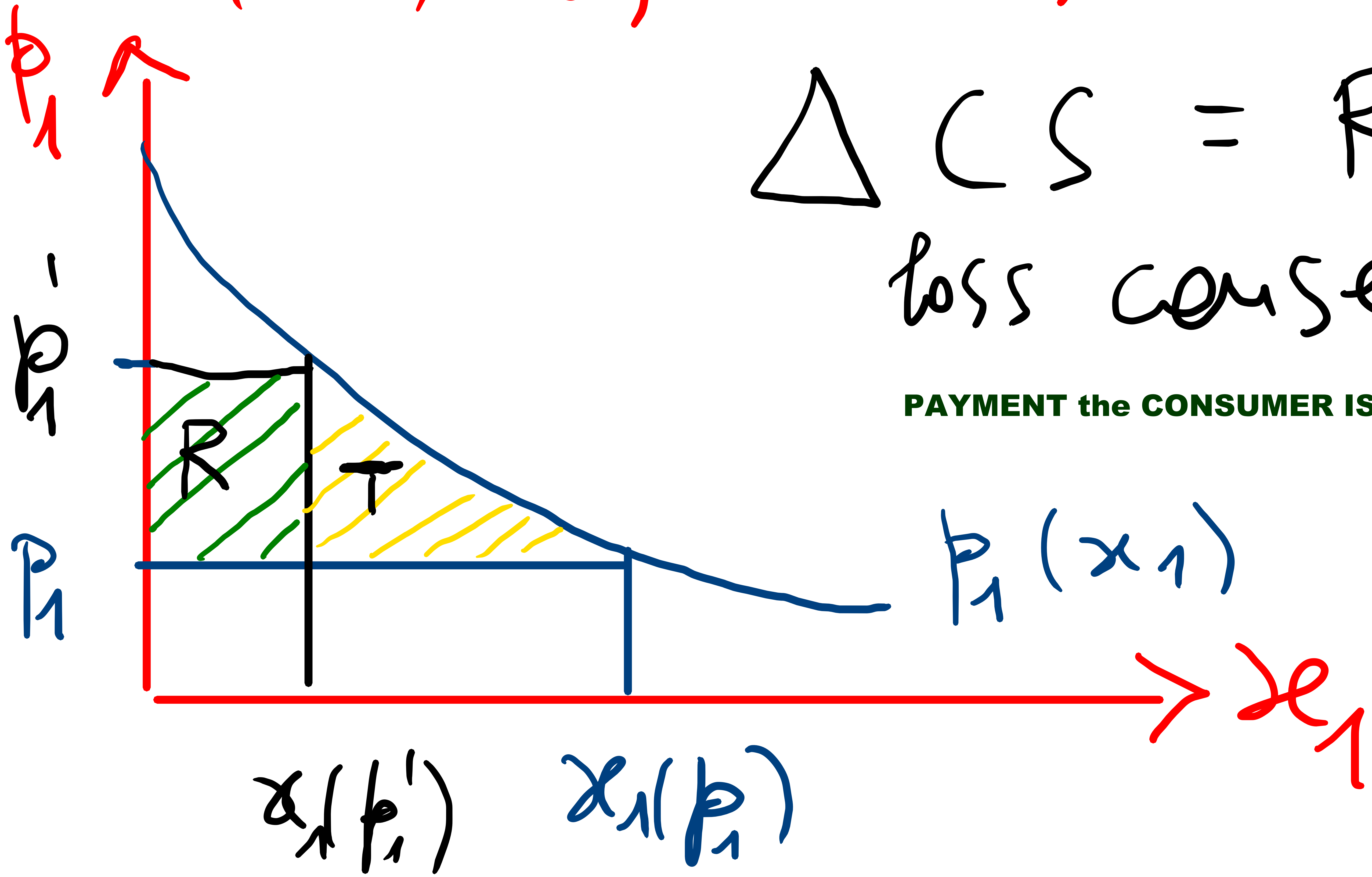
$$\text{expenditure} = x_1 p_1 = 2 p_1$$

Δ C.S. = change in consumer's surplus

$u(x_1, x_2) = v(x_1) + x_2$

$\Delta CS = R + T$ = Welfare loss caused by Δp_1 = MAXIMUM

PAYMENT the CONSUMER IS WILLING TO MAKE TO AVOID the INCREASE IN PRICE p1

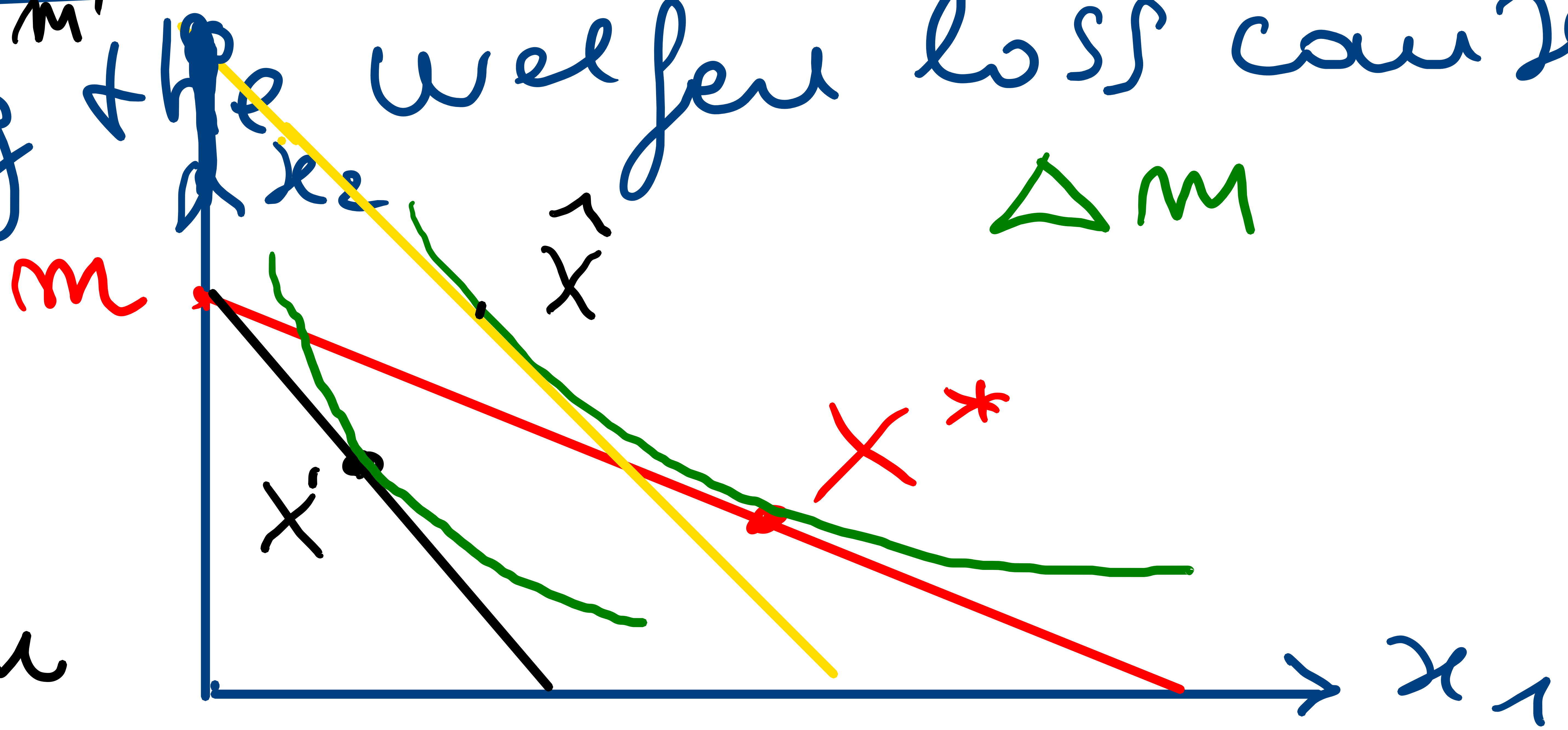


When preferences are non quasi-linear the welfare effect of Δp_1 is measured by:

$p_2 = 1$

compensative income variation: Δm

compensating the welfare loss caused by Δp_1



$m' = m + \Delta m$

$\Delta m = m' - m$

EXAMPLE:

$$u(x_1, x_2) = x_1^{1/2} \cdot x_2^{1/2} \qquad m = 120$$

$$p_1 = 1 \qquad p_2 = 1 \qquad x_1^* = \frac{1}{2} \frac{m}{p_1} = 60$$

$$\Delta p_1 = 3 \qquad p_1' = 4 \qquad x_2^* = \frac{1}{2} \cdot \frac{m}{p_2} = 60$$

$$m' \qquad \hat{x}_1 = \frac{1}{2} \cdot \frac{m'}{4} = \frac{1}{8} m' \qquad \frac{1}{8} = \frac{1}{4} \cdot \frac{1}{2}$$

$$\hat{x}_2 = \frac{1}{2} \cdot \frac{m'}{1} = \frac{1}{2} m'$$

$$u(x_1^*, x_2^*) = 60^{1/2} \cdot 60^{1/2} = 60 = u(\hat{x}_1, \hat{x}_2) =$$

$$\left(\frac{1}{8} m'\right)^{1/2} \cdot \left(\frac{1}{2} \cdot m'\right)^{1/2} = \left(\frac{1}{4}\right)^{1/2} \cdot \frac{1}{2} m' = \frac{1}{4} m' = 60$$

$$\left(\frac{1}{8}m'\right)^{1/2}\cdot\left(\frac{1}{2}m'\right)^{1/2} = \left(\frac{1}{4}\right)^{1/2}\cdot\left(\frac{1}{2}m'\right)^{1/2}\cdot\left(\frac{1}{2}m'\right)^{1/2}$$

$$= \left(\frac{1}{4}\right)^{1/2}\cdot\frac{1}{2}m' = u(x1^*, x2^*) = 60$$

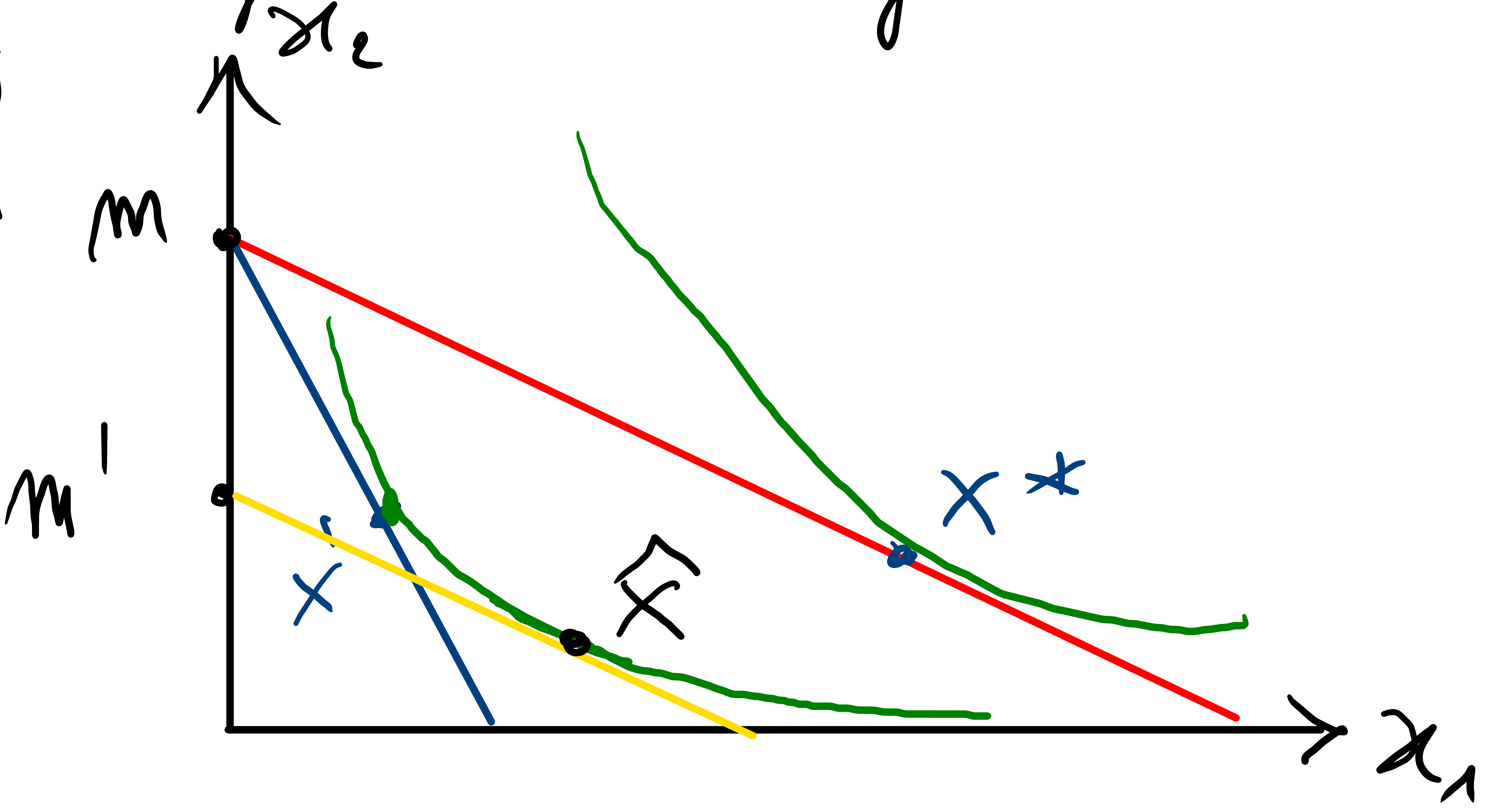
m' = 240, compensative income variation = m' - m = 240 - 120 = 120

$p_2 = 1$ Equivalent income variation

Δm = income loss at initial prices producing welfare loss = welfare loss caused by Δp_1

$\Delta m = m - m'$

$\Delta p_1 > 0$



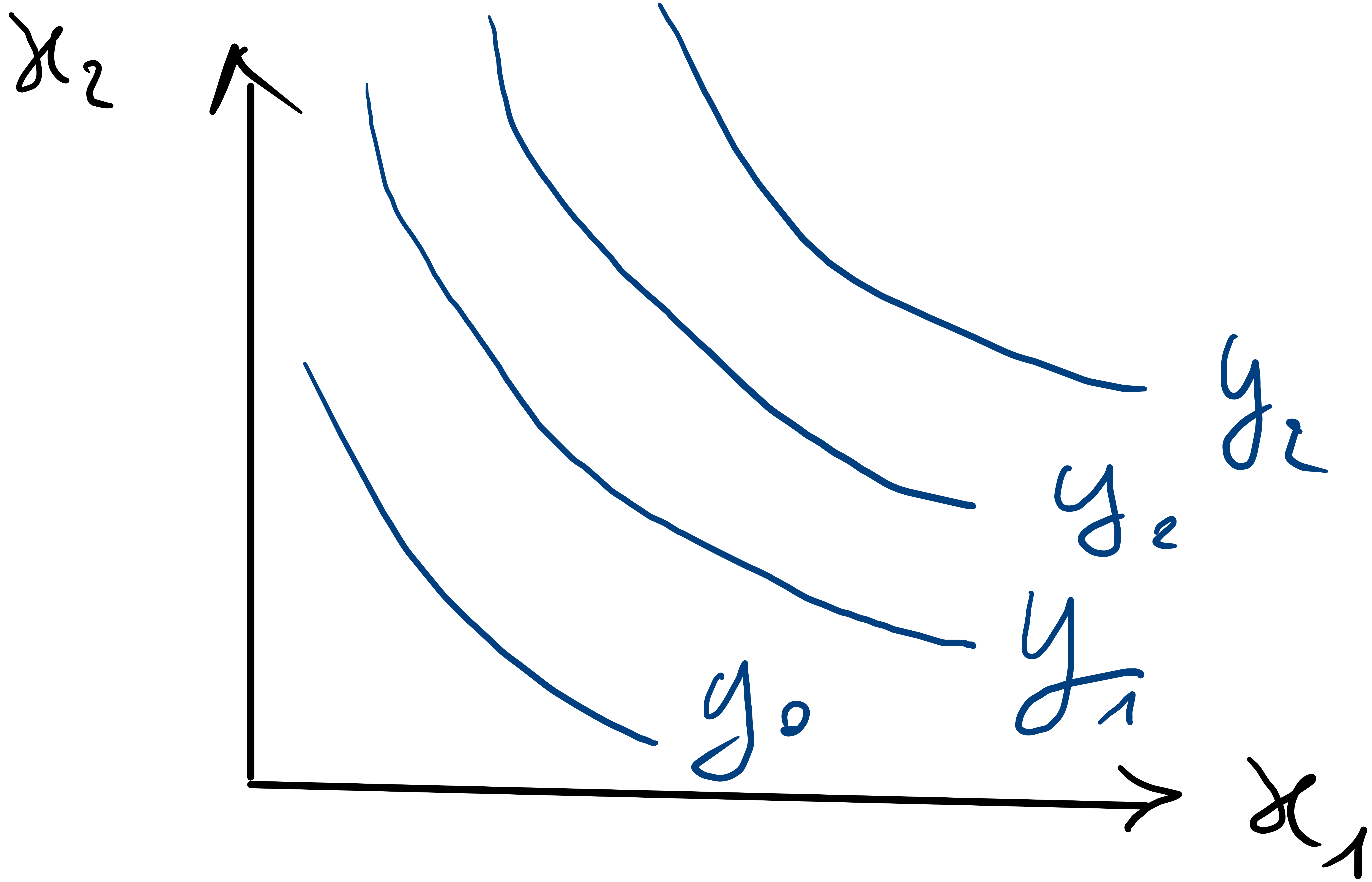
Technology

production function: two inputs x_1, x_2

1 output y

$y = f(x_1, x_2) =$ maximum output from using x_1, x_2 efficiently

isoquant: $Y = \{(x_1, x_2) \mid f(x_1, x_2) = y\}$

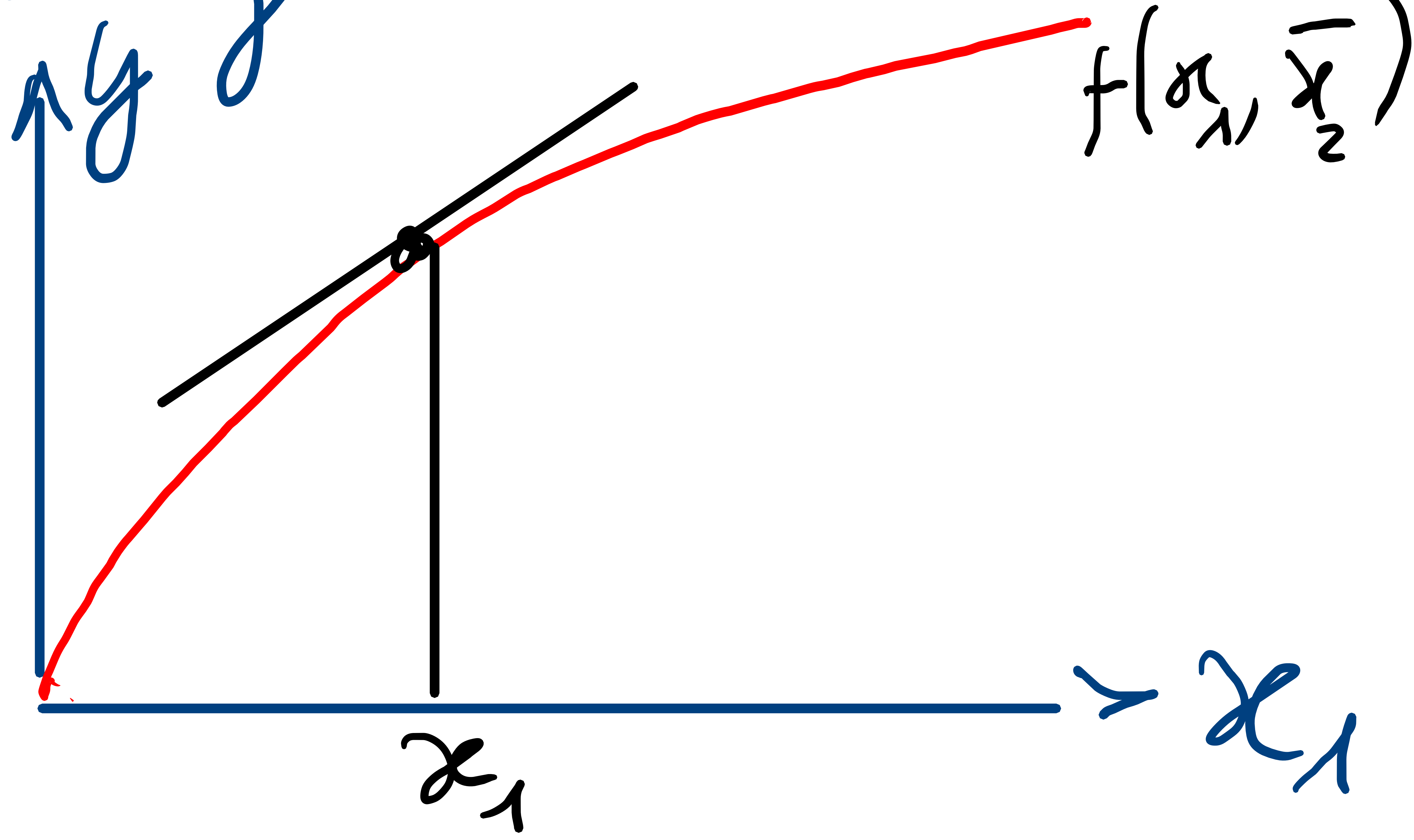


A FAMILY OF ISOQUANTS IN INPUT SPACE

short run = $\bar{x}_2$ IS FIXED

short run production function:

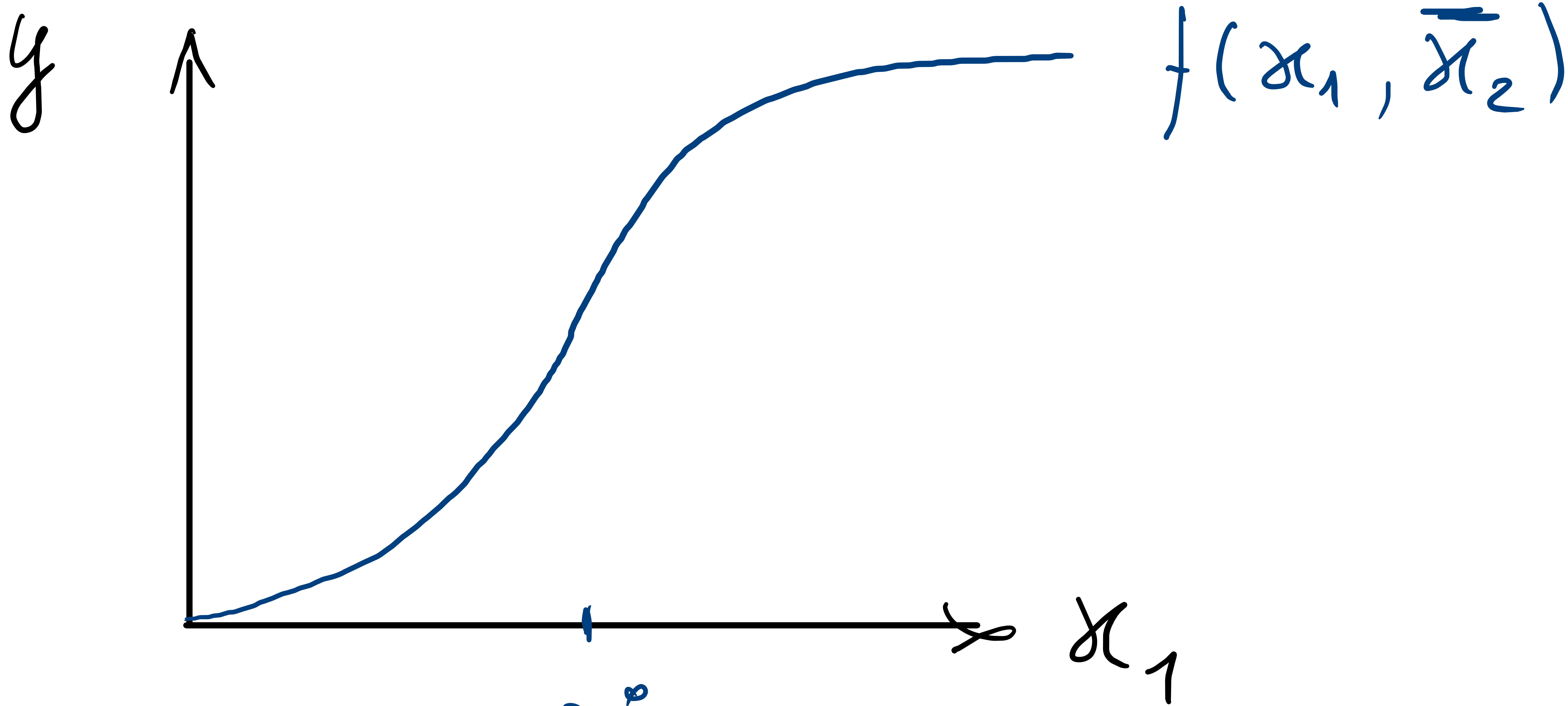
$$y = f(x_1, \bar{x}_2)$$



x_1 is necessary, since $f(0, \bar{x}_2) = 0$

$$\frac{\partial f(x_1, \bar{x}_2)}{\partial x_1} = MP_1$$

marginal productivity



IN THIS REGION THE MARGINAL PRODUCT OF x1 IS INCREASING

x_1^*

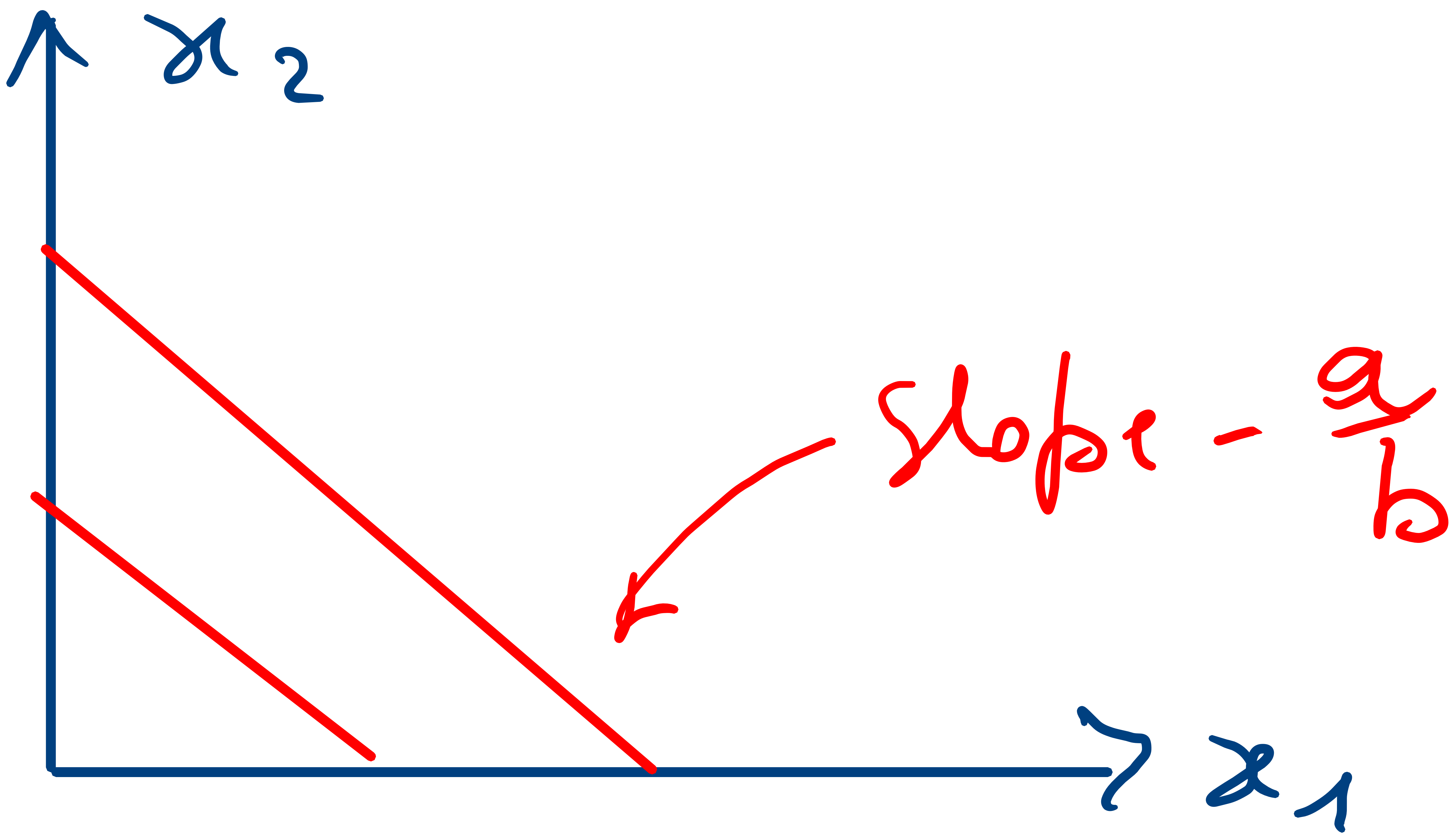
IN THIS REGION THE MARGINAL PRODUCT OF x1 IS DECREASING

perfect substitutes:

$$y = f(x_1, x_2) = a x_1 + b x_2$$

$$MP_1 = a \qquad MP_2 = b$$

$$x_2 = \frac{y}{b} - \frac{a}{b} x_1$$



R : Replicability : $y = f(a_1, a_2)$

then $\alpha y = f(\alpha a_1, \alpha a_2)$ $\alpha > 1$

D : Divisibility : the same holds

if $\alpha < 1$

R + D $\rightarrow$ constant returns to scale

$\forall \lambda > 0$ $f(\lambda x_1, \lambda x_2) = \lambda f(x_1, x_2)$