$,C) = B^{0.5} C$

a) $2 = B^{0.5} C^{0.5}$

$2 = 1 C^{0.5}$

$2 = \sqrt{C}$

$4 = C$

$(1,4) \longrightarrow (4,1)$

$2 = B^{0.5}$

$2 = \sqrt{B}$

$4 = B$

$2 = 2\sqrt{C}$

$1 = C$

$2 = 2\sqrt{B}$

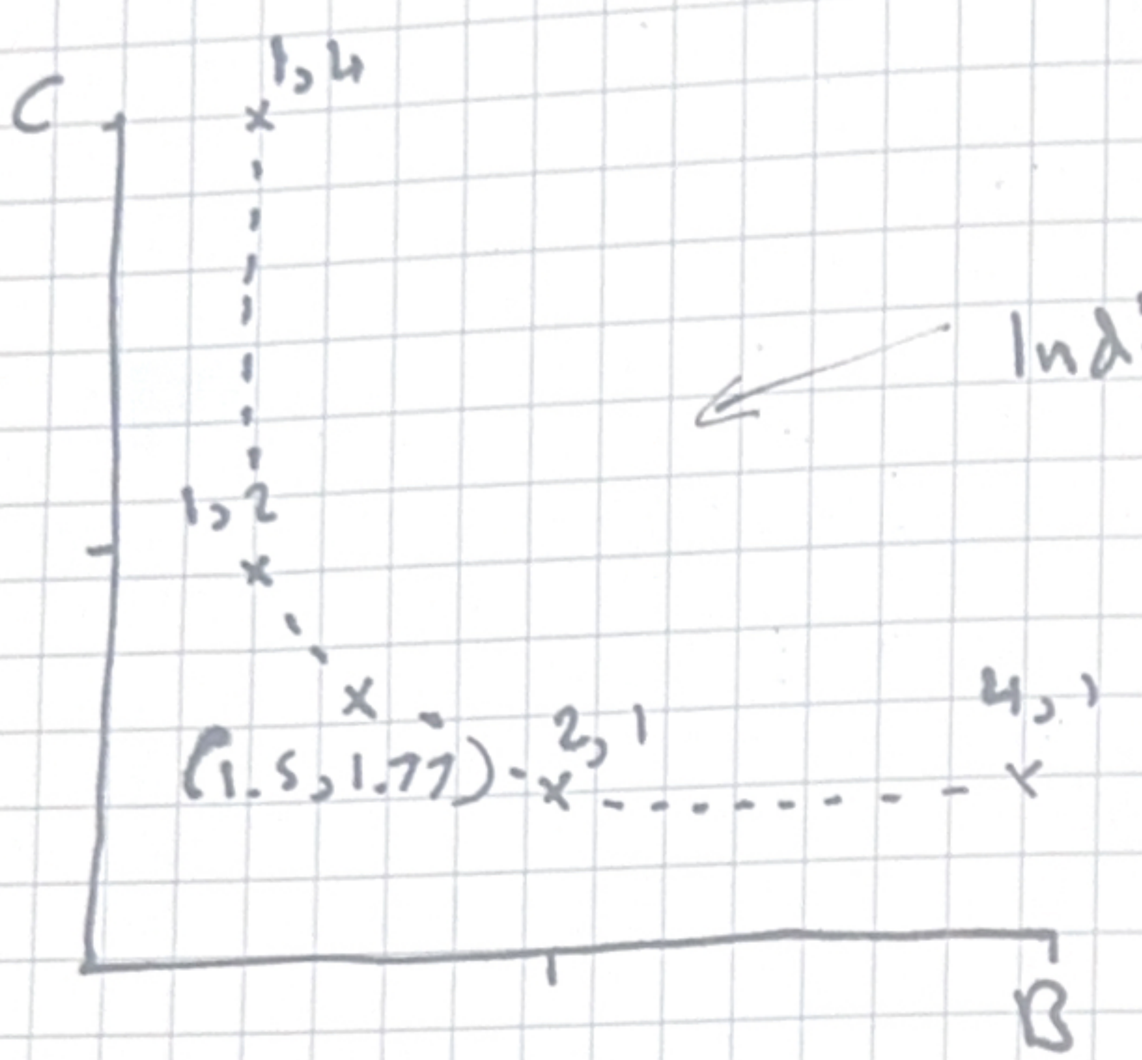
$1 = B$

$(2,1) \longrightarrow (1,2)$

$2 = 1.5\sqrt{C}$

$\frac{2^2}{1.5^2} = C$

$\frac{4}{2.25} = C$



Indifference curve.

$U(B,C) = 2$ //

b) $U(x_1, x_2) = x_1 + \sqrt{x_2}$ $\quad p_1 = 2 \quad p_2 = 1 \quad m = 50$

Constraint: $2x_1 + x_2 = 50$

$\mathcal{L} = x_1 + \sqrt{x_2} - \lambda[2x_1 + x_2 - 50]$

$\frac{\partial L}{\partial x_1}$ MUx_1: $1 + 0 - 2\lambda = 0$

$\frac{\partial L}{\partial x_2}$ MUx_2: $0 + 0.5x_2^{-0.5} - \lambda = 0$

$\frac{1}{2} = \lambda$

$\frac{0.5}{\sqrt{x_2}} = \frac{1}{2}$

$\frac{1}{\sqrt{x_2}} = \frac{1}{4}$

$x_2 = 4^2$

$x_2 = 16$ //

$2x_1 + 16 = 50$

$x_1 = 22$ //

c) $u(B, C) = B^{..}C$ p_B $p_C = 1$ $m = 24$

Constraint: $4B + C = 24 \rightarrow C = 24 - 4B$

Optimal occurs:

$$-4 = \frac{-MU_B}{MU_C}$$

MU_B: $0.5B^{-0.5}C^{0.5}$

MU_C: $0.5C^{-0.5}B^{0.5}$

$$-4 = \frac{-0.5B^{-0.5}C^{0.5}}{0.5C^{-0.5}B^{0.5}}$$

$$-4 = \frac{-C}{B}$$

$$-4B = -C$$

$$4B = C$$

$m = 32$: $8B = 24$

$B = 3$ $\rightarrow (3, 12)$

$C = 12$

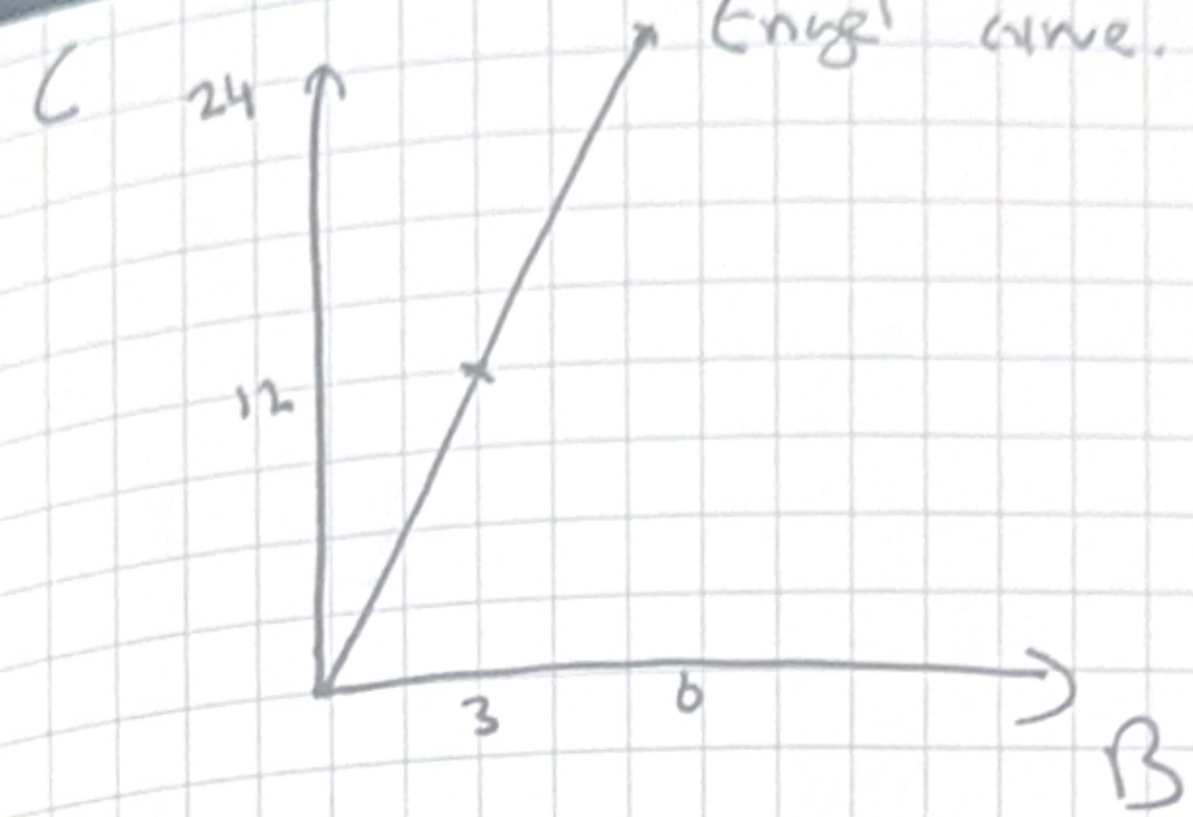
$m = 48$: $8B = 48$

$B = 6$ $\rightarrow (6, 24)$

$C = 4B$

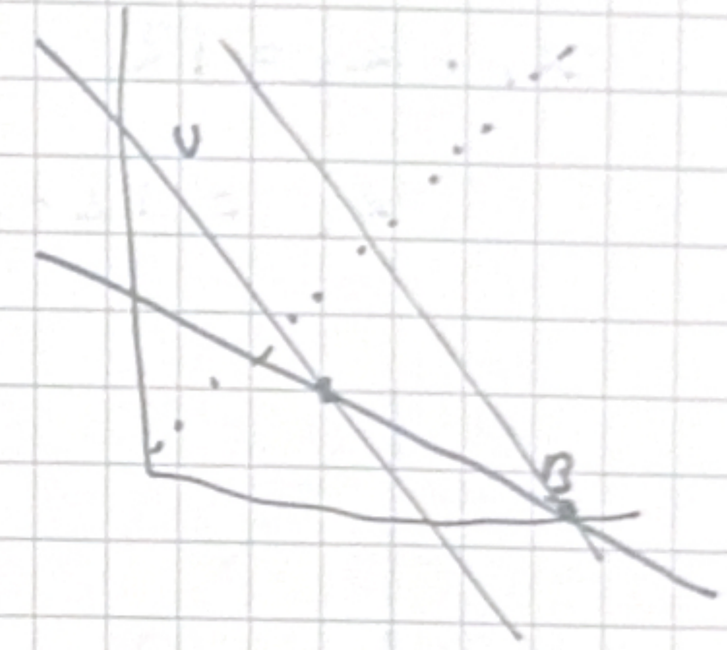
$= 24$

Ratio: $(1, 4)$ $\therefore$ Engel curve: $C = 4B$ //



d) $u(x_1, x_2) = 4x_1 + x_2$

$2x_1 + x_2 = 10$



Optimum at $u(x_1, 0)$

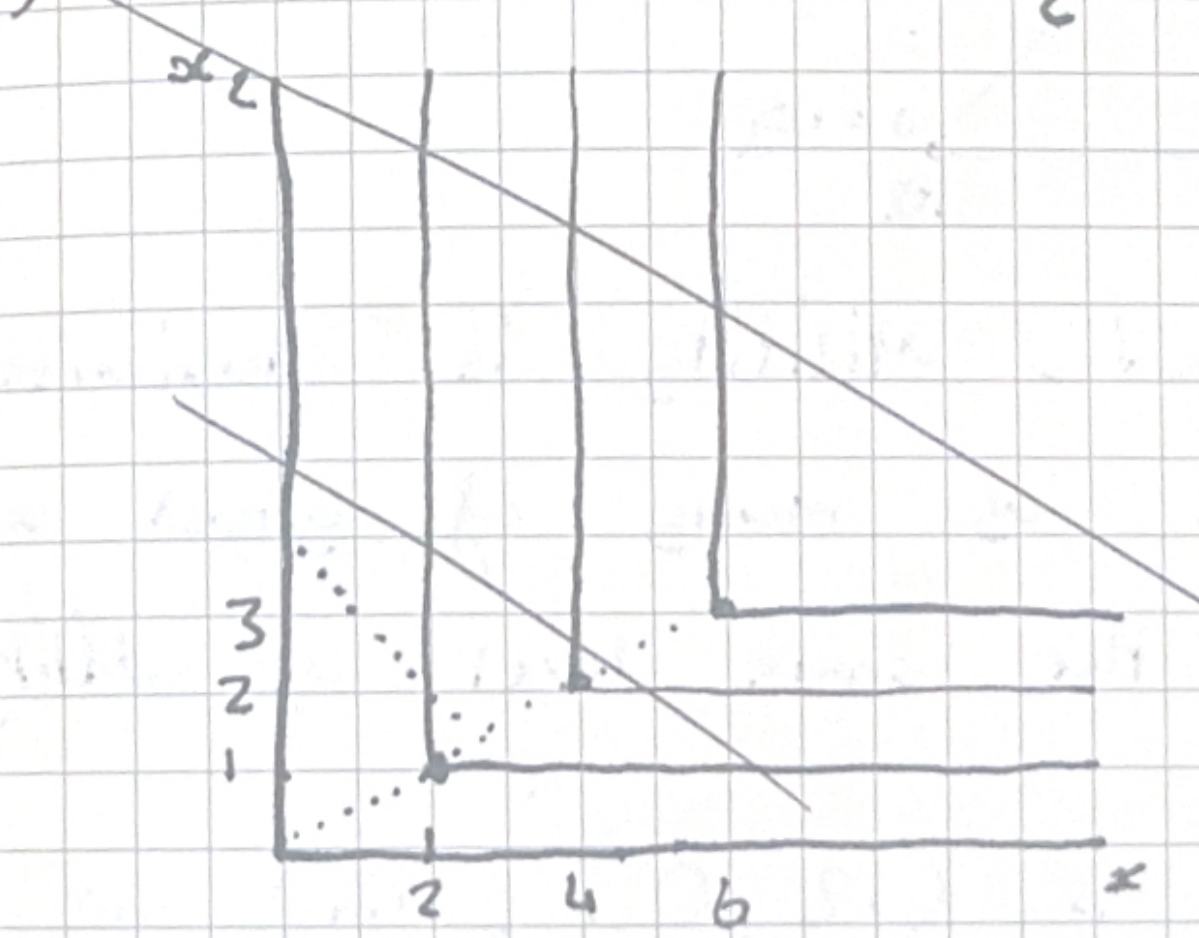
$\therefore$

$2x_1 + 0 = 10$

$x_1 = 5$ //

$x_2 = 0$ //

e) $u(x_1, x_2) = \min\{x_1, 2x_2\}$

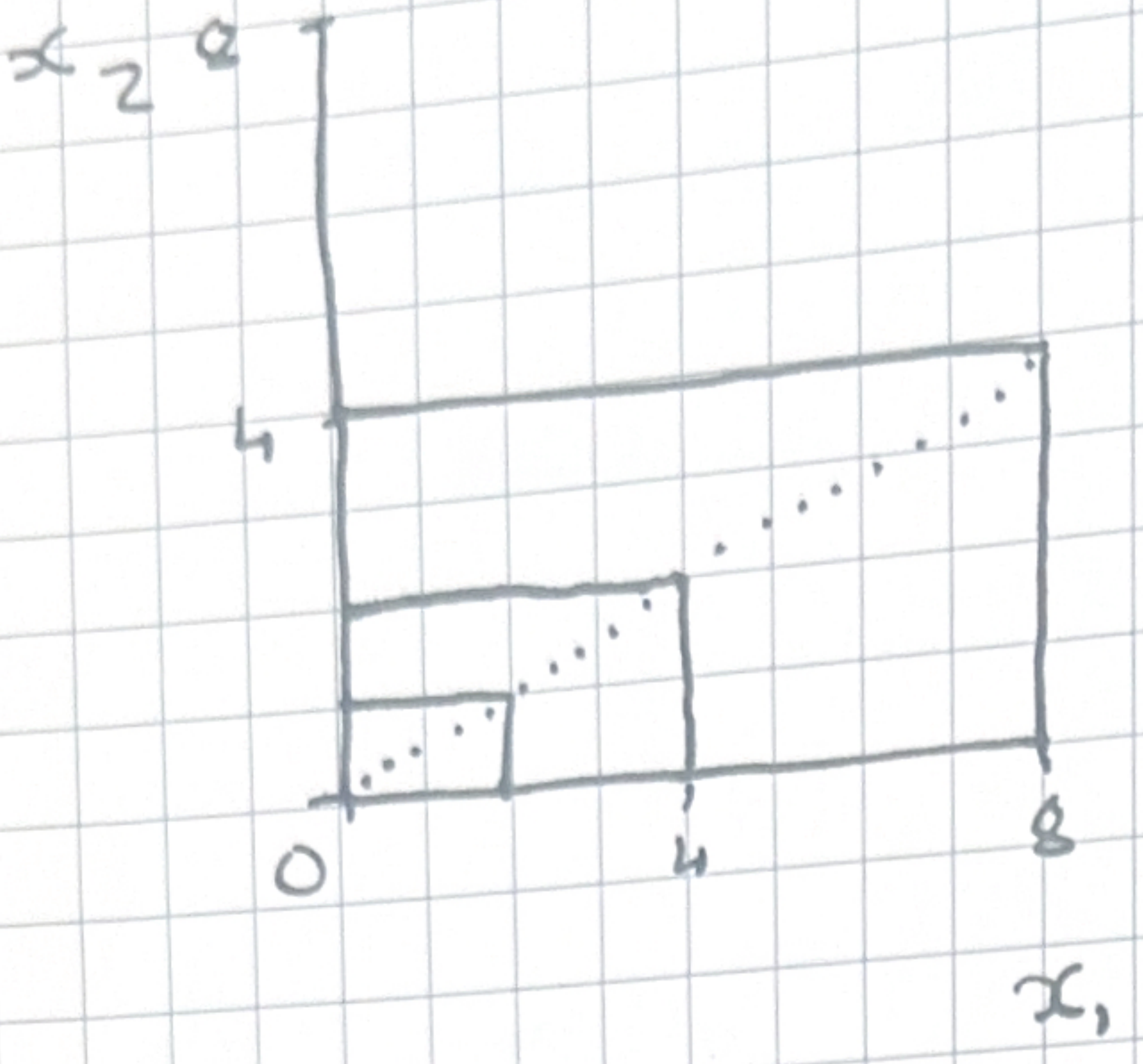


~~(10, 10)~~

~~(12, ...)~~

if $p_1 < 2p_2$:

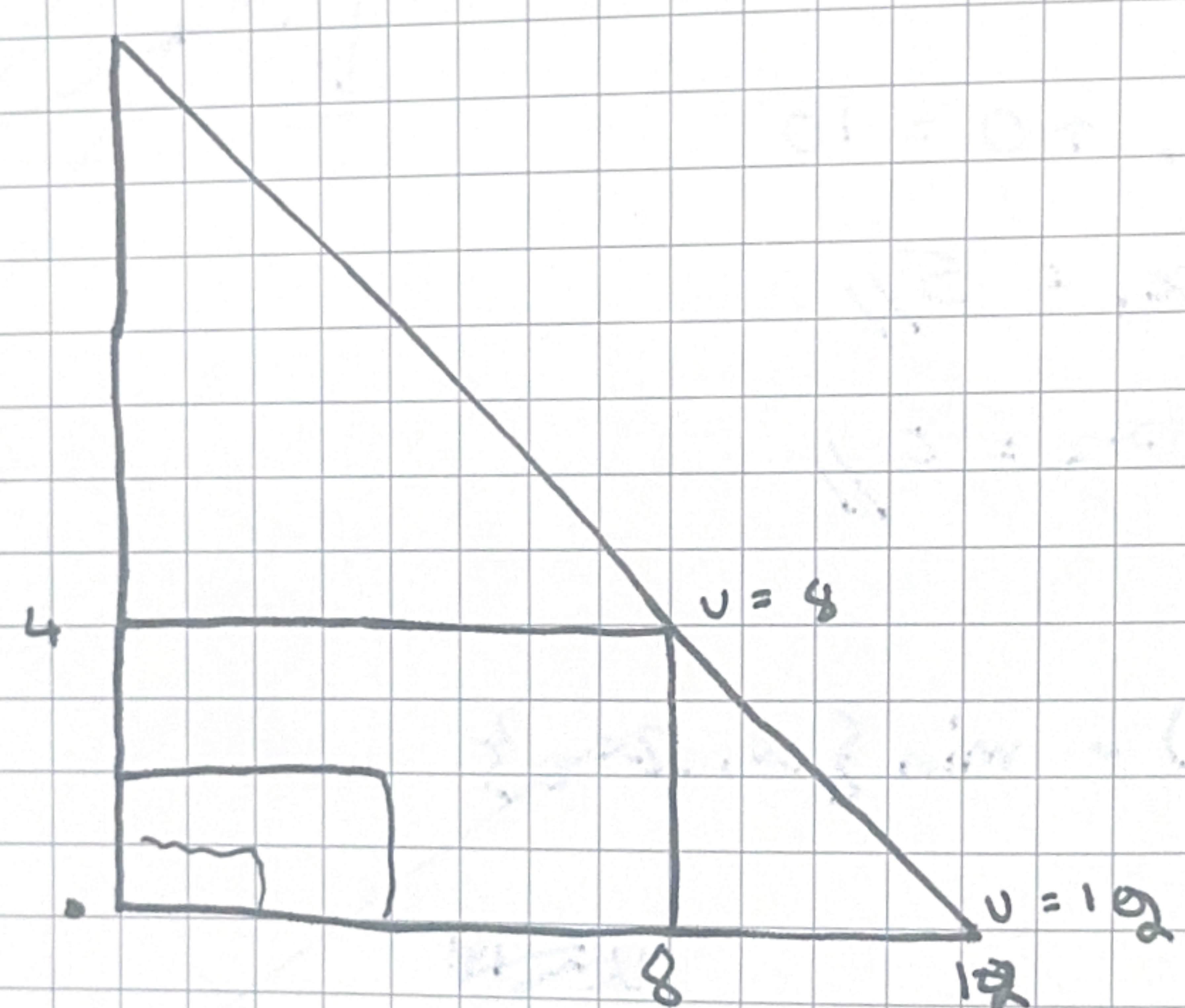
e) $U = \min\{x_1, 2x_2\}$



$P_1 = 1$ $P_2 = 1$ $M = 12$

$x_1 + x_2 = 12$

$x_2 = 12 - x_1$



Since prices are identical, utilitity is maximised by x_1, since twice as many of good x_2 is required to reach the same level of utility.

Thus, the optimal bundle is $(12, 0)$, and no interior solutions.