

Q. $u_A = \frac{1}{2} \ln x_A + \frac{1}{2} \ln x_B$ $w_A = (70, 20)$ Draw the Edgeworth box & find the contract curve.
 $u_B = x_B \cdot y_B$ $w_B = (30, 30)$

$w = w_A + w_B = (70+30, 20+30) = (100, 50)$
 Total X available: 100
 Total Y available: 50

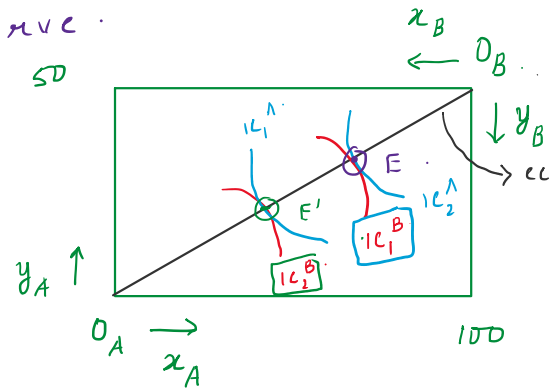
Pts of tangency of IC's \Rightarrow contract curve.

$\Rightarrow \boxed{MRS_A = MRS_B} \Rightarrow$ Eqn of the contract curve.

$\therefore x_A + x_B = 100$ and $y_A + y_B = 50$

$MRS_A = \frac{\partial u / \partial x_A}{\partial u / \partial y_A} = \left(\frac{y_A}{x_A} \right)$

$MRS_B = \frac{\partial u / \partial x_B}{\partial u / \partial y_B} = \left(\frac{y_B}{x_B} \right)$



\therefore Eqn of the contract curve: - $MRS_A = MRS_B$

$\Rightarrow \frac{y_A}{x_A} = \frac{y_B}{x_B} = \frac{50 - y_A}{100 - x_A}$

$\Rightarrow 100y_A - x_A y_A = 50x_A - x_A y_A$

$\Rightarrow 2y_A = x_A \Rightarrow \boxed{y_A = \frac{x_A}{2}}$

Eqn of the contract curve.

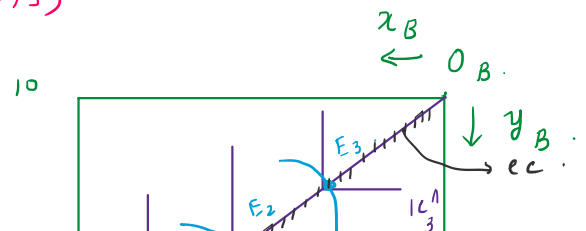
Q. $u_A(x_A, y_A) = \min\{x_A, y_A\}$ $w_A = (5, 5)$

$u_B(x_B, y_B) = x_B \cdot y_B$ $w_B = (5, 5)$

Find the contract curve.

$w = w_A + w_B = (10, 10)$

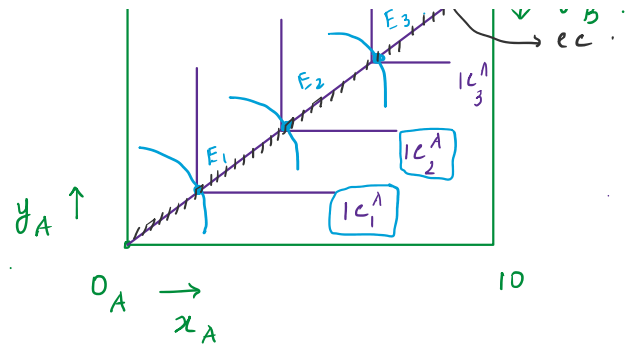
$u_A = \min\{x_A, y_A\}$



$$u_A = \min\{x_A, y_A\}$$

$$\therefore \text{At opt: } x_A = y_A$$

\therefore All pareto opt pts will lie on $x_A = y_A$ line.



Contract curve: $y_A = x_A, 0 \leq x_A \leq 10, 0 \leq y_A \leq 10$.

Q. $u_A(x_A, y_A) = \min\{x_A, y_A\}$ $w_A = (4, 5)$

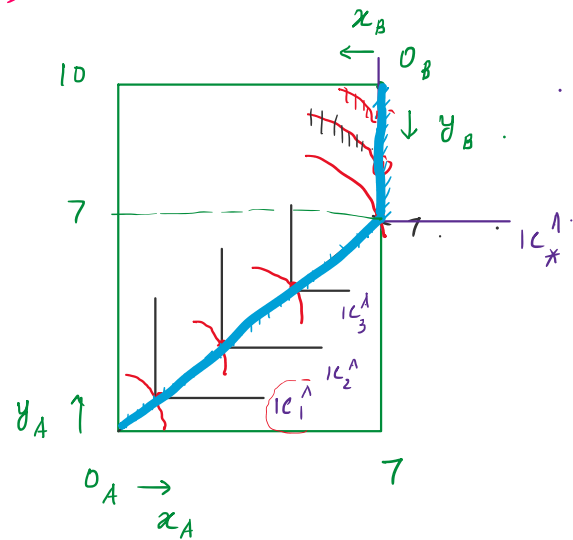
$u_B(x_B, y_B) = x_B \cdot y_B$ $w_B = (3, 5)$

Find the contract curve

$w = (7, 10)$

For A, opt: $x_A = y_A$

Contract curve: $\begin{cases} x_A = y_A, 0 \leq y_A \leq 7 \\ x_A = 7, y_A \in [7, 10] \end{cases}$



B. $u_A(x_A, y_A) = x_A + y_A$ $w_A = (1, 2)$

$u_B(x_B, y_B) = x_B \cdot y_B$ $w_B = (2, 1)$

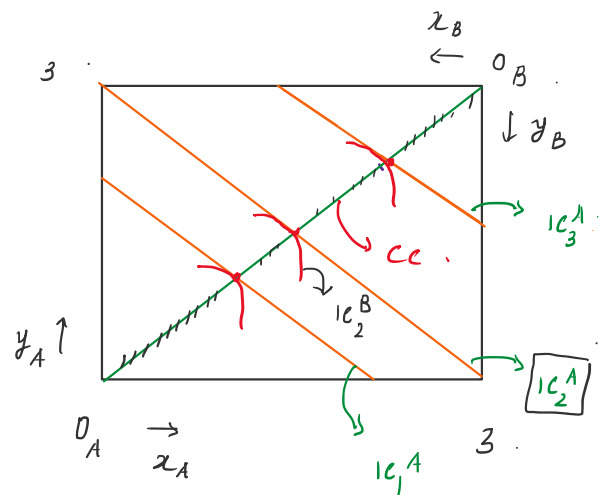
Find the contract curve.

$w = w_A + w_B = (3, 3)$

$u_A = x_A + y_A$

$MRS_A = 1$

$MBS_B = \frac{y_B}{x_B}$



For contract curve: $1 = \frac{y_B}{x_B} = \frac{3 - y_A}{3 - x_A}$

$\rightarrow x = y$

$$x_B = 3 - x_A$$

$$\Rightarrow 3 - x_A = 3 - y_A \Rightarrow \boxed{x_A = y_A}, \quad 0 \leq x_A \leq 3$$

$$0 \leq y_A \leq 3$$

$$8. \quad u_A(x_A, y_A) = x_A + y_A$$

$$w_A = (7, 5)$$

$$u_B(x_B, y_B) = x_B + 2y_B$$

$$w_B = (8, 5)$$

$$w = w_A + w_B = (15, 10)$$

$$MRS_A = 1$$

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

Eg: consider the Pareto opt allocation:

$$A = (10, 0) \quad B = (5, 10)$$

$$\text{Contract curve: } \begin{cases} x_A \in [0, 15], y_A = 0 \\ x_A = 15, y_A \in [0, 10] \end{cases}$$

