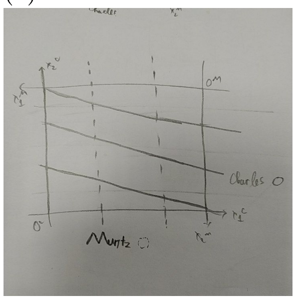
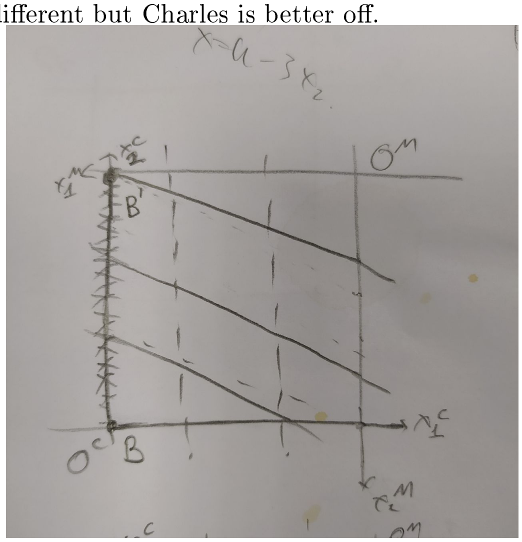
Question 3

(a)



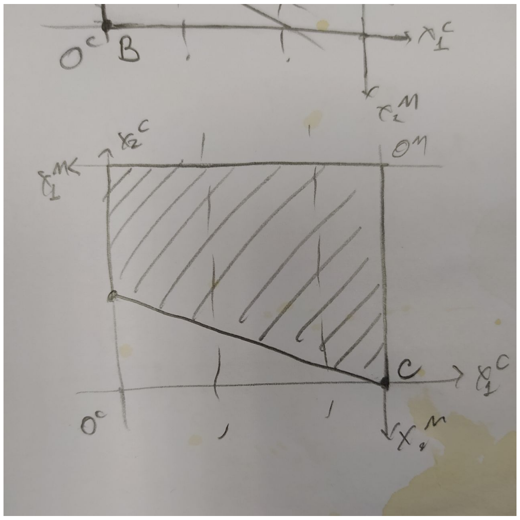
(b)

- It's not Pareto efficient. With the points along the line BB', Muntz is indifferent but Charles is better off.



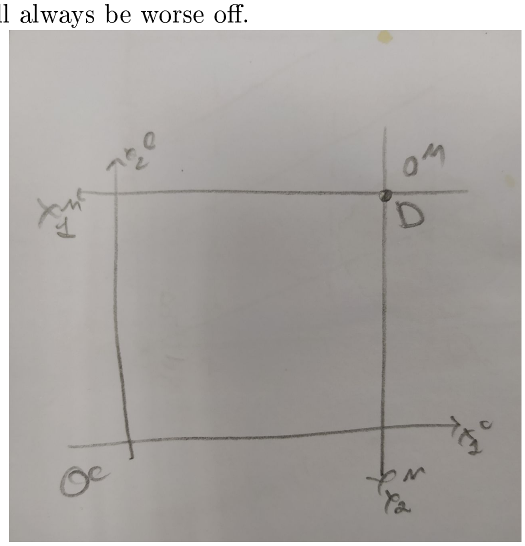
(c)

- C is not Pareto efficient. The colored segment is better off for both of them.



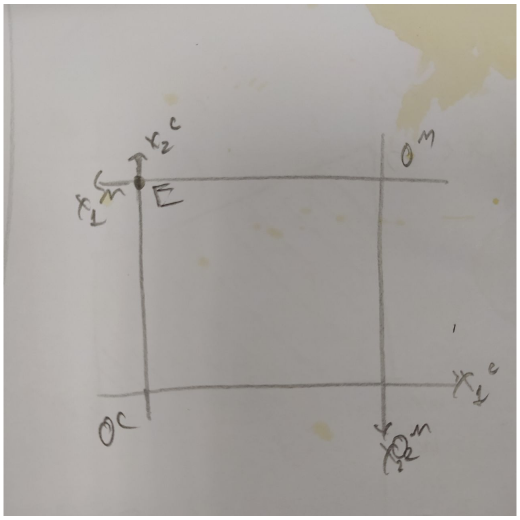
(d)

- D is Pareto efficient. Moving anywhere means $\downarrow x_1^C$ *or* $\downarrow x_2^C$ and Charles will always be worse off.



(e)

- E is Pareto efficient. Moving anywhere means $\downarrow x_1^M$ *or* $\downarrow x_2^C$ and either Charles or Muntz must be worse off.



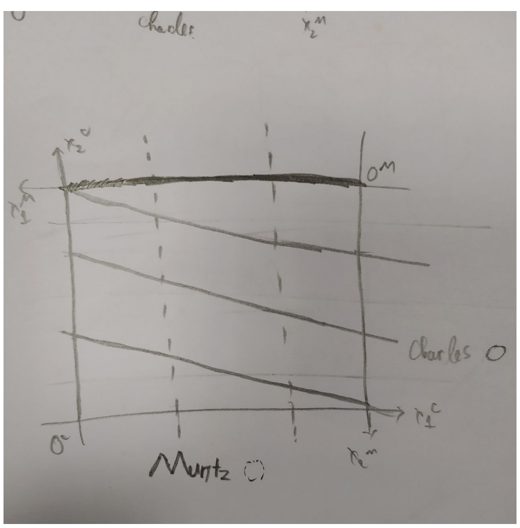
(f)

- Since U^M is independent from x_2^M, but U^C increases as x_2^C increases, it is best to allocate all available x_2 to Charles.

$$\Rightarrow \textit{All point where } x_2^C = 6$$

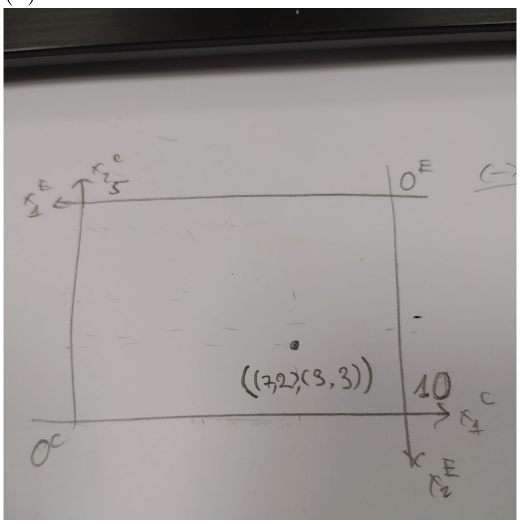
- Since both Charles and Muntz likes x_1, so every point on $x_2^C = 6$ is unnegotiable $\Rightarrow$All of those points are Pareto efficient
- Contract curve function:

$$x_2^C(x_1^C) = 6$$



Question 4

(a)



(b)

- Using tangental condition to check for efficiency
- For Carl:

$$U^C = ln(x_1^C) + ln(x_2^C)$$

$$\Rightarrow \begin{cases} MU_1^C & = \frac{dU^C}{dx_1^C} = \frac{1}{x_1^C} \\ MU_2^C & = \frac{dU^C}{dx_2^C} = \frac{1}{x_2^C} \end{cases}$$

$$MRS_{1,2}^C = \frac{MU_1^C}{MU_2^C} = \frac{x_2^C}{x_1^C}$$

- Same for Ellie:

$$MRS_{1,2}^E = \frac{MU_1^E}{MU_2^E} = \frac{x_2^E}{x_1^E}$$

- If endowment point is efficient:

$$MRS_{1,2}^C = MRS_{1,2}^E$$

$$\frac{x_2^C}{x_1^C} = \frac{x_2^E}{x_1^E}$$

$$\frac{2}{7} = \frac{3}{3} \ (Contradiction!)$$

- So the endowment point is Pareto inefficient.

(c) - Feasibility:

$$x_1^E = 10 - x_1^C$$

$$x_2^E = 5 - x_2^C$$

- Tangental condition:

$$MRS_{1,2}^C = MRS_{1,2}^E$$

$$\frac{x_2^C}{x_1^C} = \frac{x_2^E}{x_1^E}$$

$$\frac{x_2^C}{x_1^C} = \frac{5 - x_2^C}{10 - x_1^C}$$

$$x_2^C(10 - x_1^C) = x_1^C(5 - x_2^C)$$

$$10x_2^C = 5x_1^C$$

$$x_2^C = \frac{1}{2}x_1^C$$