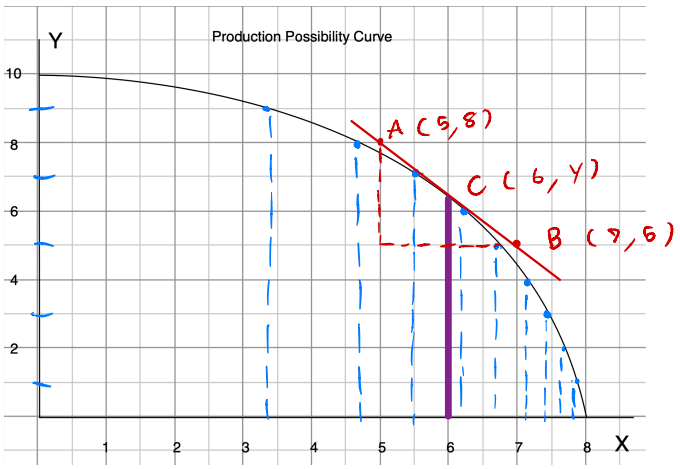
HW 2 Due Thursday, February 4, 2021

1. Nonlinear PPC



a) Find the opportunity cost of each additional unit of y in terms of units of x

y	x	Opp. Cost of y
0	8	0.1
1	7.9	0.13
2	7.77	0.27
3	7.5	0.3
4	7.2	0.45
5	6.75	0.5
6	6.25	0.75
7	5.5	0.8
8	4.7	1.1
9	3.3	3.3
10	0	

less of x when y increases 1 unit

b) Is the opportunity cost of y increasing? Point C

c) Compute the opportunity cost per unit of y when $x = 6$.

d) At $x = 6$, approximate how much more x can be produced if we have y less by 0.2 units.

Answer :

b.) Yes, exponentially.

c.) Using tangent line at $x = 6$ to determine the slope at point C

$$\frac{\Delta y}{\Delta x} = \frac{8-5}{5-7} = -\frac{3}{2} = -1.5$$

* but when we are computing opp. cost per unit of y the slope have to be $\frac{1}{\text{slope}}$.

So, slope $= \frac{1}{-1.5} = -0.67$ *

d.) at $x = C$, slope $= -0.67$

$\therefore$ we can estimate Δx knowing that $\Delta y = -0.2$

$$\Delta x \approx \frac{1}{\text{slope}} \cdot \Delta y$$
$$\approx \frac{1}{(-1.5)} \cdot (-0.2)$$
$$\approx 0.133$$

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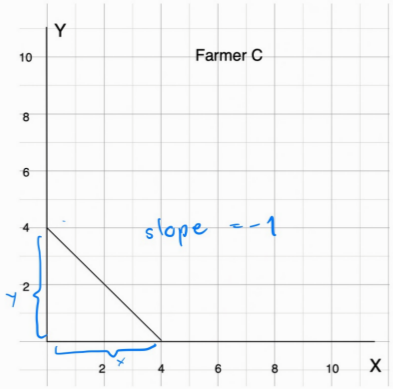
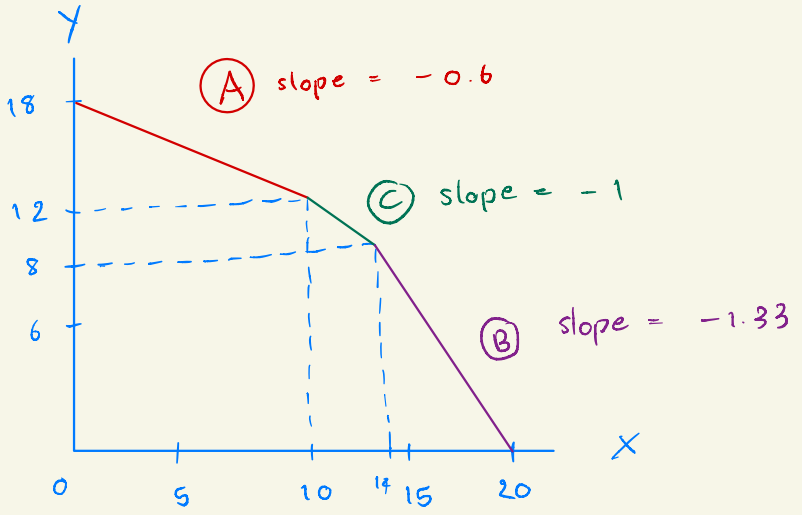
2. Farmer C has the PPC given below. Find the PPC of all three farmers A, B and C combined.



2.)



x	y	
0	18	↙ slope (A)
1	17.4	
2	16.8	
3	16.2	
⋮	⋮	
10	12	← slope (C)
11	11	
12	10	
13	9	
14	8	← slope (B)
15	6.67	
16	5.34	
17	4.01	
⋮		
20	0	

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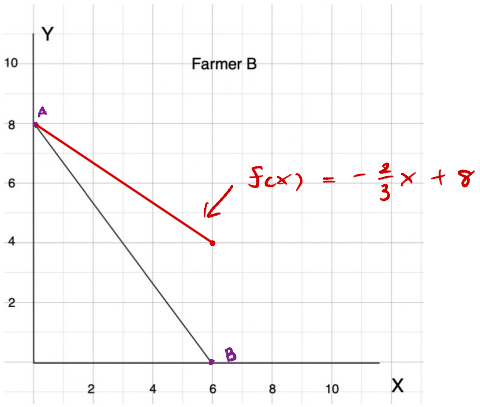
HW. If a new fertilizer is found to double the output of rice (x) for any level of production of fish (y), how will PPC of farmer B change? Does the opportunity cost of x increase? Does the opportunity cost of y increase?



Note that the linear line $y = mx + c$, when m = slope

At point A (0, 8) and B (6, 0)

Find slope (m)

$$m = \frac{\Delta y}{\Delta x} = -\frac{8}{6} = -\frac{4}{3}$$

Find C

replace x with 0 as input

$$y = -\frac{4}{3}(0) + C$$

$$8 = C$$

Now we have $y = -\frac{4}{3}x + C$ $\therefore$ $y = -\frac{4}{3}x + 8$

However we need x in term of y for the equation, in order to multiply 2 for the x. (double output : x)

$$y = -\frac{4}{3}x + 8$$

$$y - 8 = -\frac{4}{3}x$$

$$-\frac{3}{4}(y - 8) = x$$

$$f(y) \sim x = -\frac{3}{4}y + 6$$

$$f(y)_{new} = 2f(y) = 2\left(-\frac{3}{4}y + 6\right)$$

$$f(y)_{new} = -\frac{6}{4}y + 12$$

$$\therefore \quad f(y)_{new} = -\frac{3}{2}y + 12$$

$$x_{new} = -\frac{3}{2}y + 12$$ ← New ppc

$$-\frac{2}{3}(x - 12) = y$$

$$y = -\frac{2}{3}x + 8$$ ※

Questions : Does the opp cost of x increase ?

Answer : No, instead the opp cost of x decreasing from $\frac{4}{3}$ to $\frac{2}{3}$ of y per unit of x.

Q_2 : Does the opp cost of y increase ?

A_2 : Yes, from $\frac{3}{4}$ to $\frac{3}{2}$ of x per unit of y.

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