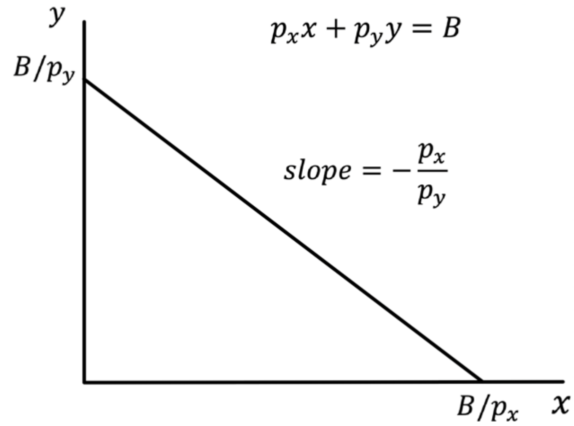
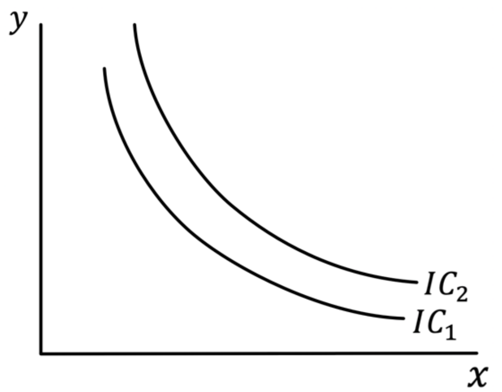
Chapter 13 Income and Price Consumption Curves

Changes of Consumption Equilibrium can be caused by the change in

1. Income
2. Price of a good



- Only one change at a time and Indifference Curves are assumed to be unchanged.



2. Change in Price of x. p_x changes while p_y and income B remain unchanged.

The original equilibrium is at $E = (x_0, y_0)$ where the budget line is tangent to IC_0, with equilibrium conditions:

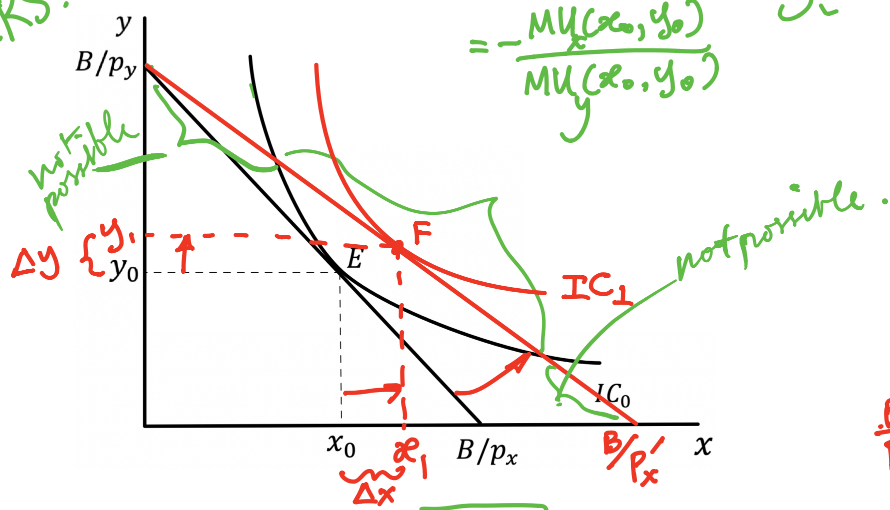
1) $p_x x_0 + p_y y_0 = B$

2) $\frac{MU_x(x_0,y_0)}{MU_y(x_0,y_0)} = \frac{p_x}{p_y}$.

MRS. =

$\underbrace{MRS\, at\, (x_0, y_0)} = -\frac{P_x}{P_y}$

$= -\frac{MU_x(x_0,y_0)}{MU_y(x_0,y_0)}$



B = 120.
$P_x = 3$. $P'_x = 2$.
$\frac{B}{P_x} = \frac{120}{3} = 40$.
$\frac{B}{P'_x} = \frac{120}{2} = 60$

Price of x decreases from $\boxed{p_x \text{ to } p'_x.}$ $(p_x > p'_x)$

- New equilibrium is at $F = (x_1, y_1)$ where we have the equilibrium conditions:

1) $p'_x x_1 + p_y y_1 = B \Leftrightarrow F = (x_1, y_1)$ is affordable,

2) $\frac{MU_x(x_1,y_1)}{MU_y(x_1,y_1)} = \frac{p'_x}{p_y}$

because consumers can get to a higher IC.

- When p_x decreases, the consumer always enjoys higher satisfaction. With same reason, when price of a good increases, the consumer always suffers lower satisfaction.
- When price of one good changes, the consumer adjusts consumption of both x and y to maximize his satisfaction.

We can have the following 3 possible outcomes:

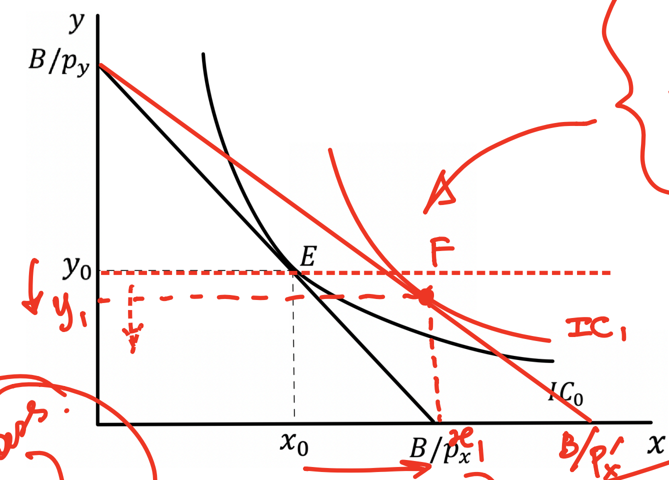
a) When p_x decreases, as shown in the previous graph above the consumer consumes

more of $x = \Delta x = x_1 - x_0 > 0$ and

more of $y = \Delta y = y_1 - y_0 > 0$.

- p_x decreases $\Longrightarrow$ buys more of x (Law of Demand)
- p_x decreases $\Longrightarrow$ buys more of y (x and y are ~~substitutes~~/complementaries)

b) More x and less y



when P_x decreases, consumer buys more of x and less of y. — uses x as substitute for y.

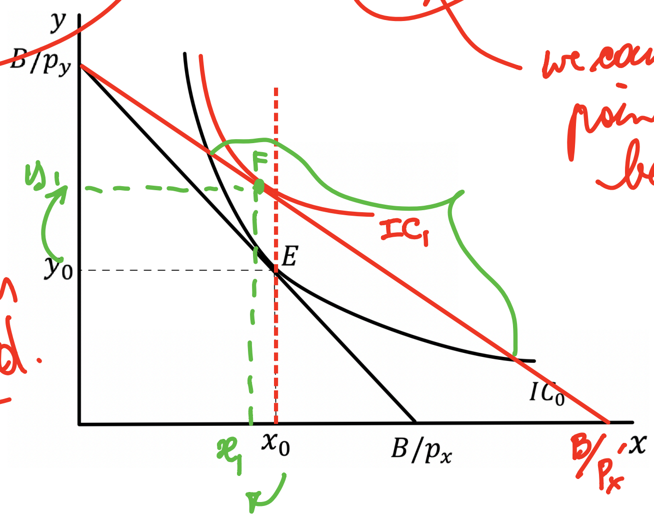
when income changes.

c) Less x and more y. Is x inferior? yes/no ?

P_x decreases.

we cannot conclude at this point that x is inferior. because we see only P_x being lower but B(income) unchanged!

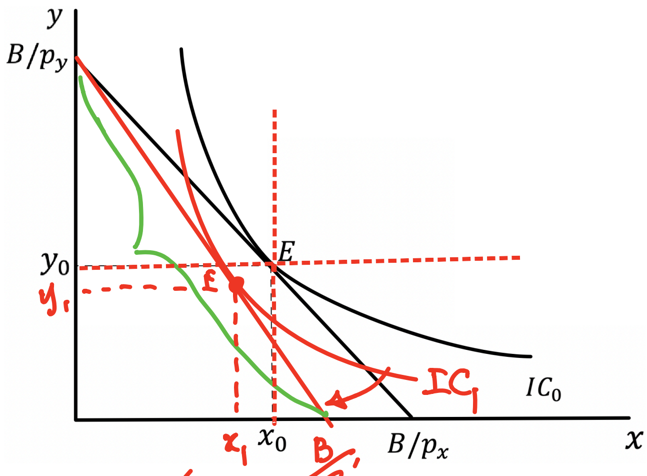
— To be seen later that in this case x is inferior indeed.



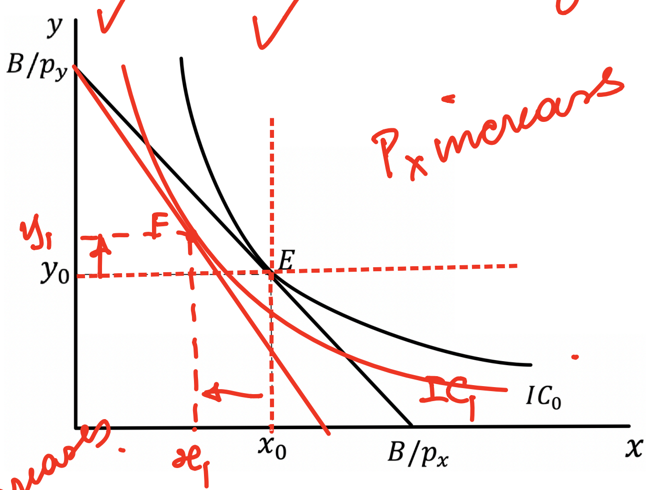
x is Giffen good.

When p_x increases, we can have the following cases:

a) Less of x and less of y.

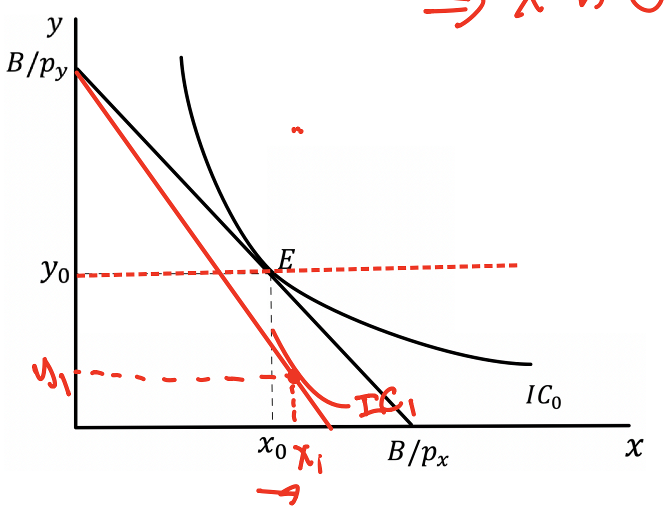


b) Less of x and more of y. — Buy more y to substitute for x.



P_x increases.

c) More of x and less of y. ⇒ x is Giffen good.

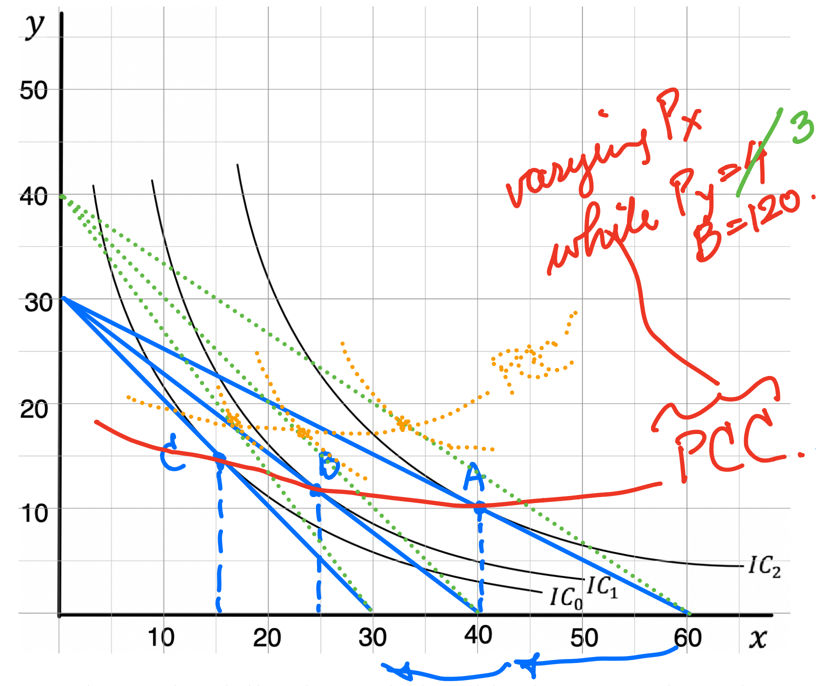


Price Consumption Curve (PCC) is a line whose every point is a consumption equilibrium for varying price p_x at given fixed price p_y and income B.

- we can also have a PCC by varying P_y and keep P_x & B constant.

- With given $p_y = 4$ and $B = 120$, we can find the following equilibria at various prices $p_x = 2,3\ and\ 4.$

$2x+4y=120.$
$3x+4y=120$
$4x+4y=120$



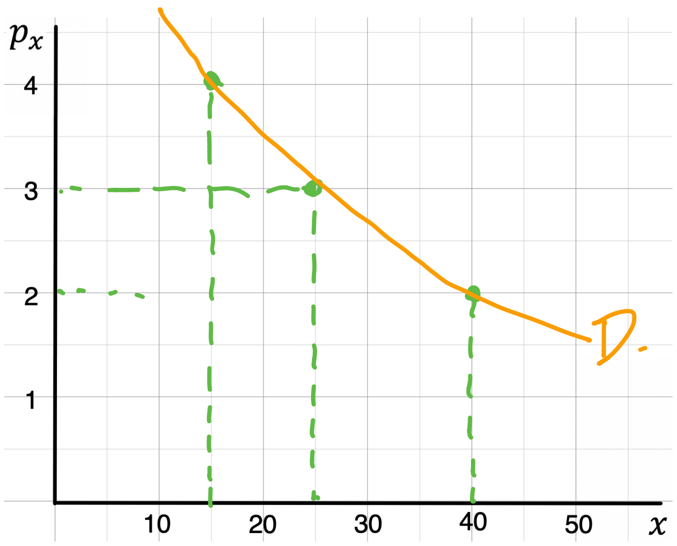
when Py=4
B=120

P_x	x
2	40
3	25
4	15

relationship between P_x and quantity X that the consumer is able (because the consumer buys at A,B,C that are on budget line — affordable) and willing to buy

because all points A,B,C are the points the consumer maximizes his satisfaction.

- We have the following relationship between the price $p_x = 2,3\ and\ 4$, and the resulting quantities of x that the consumer



- Since a given PCC is created by varying p_x while keeping p_y and income B constant, this relationship of the p_x and the resulting quantity of x that the consumer buys with highest satisfaction with the income available.
- This relationship is the demand function as defined previously.

Properties of PCC

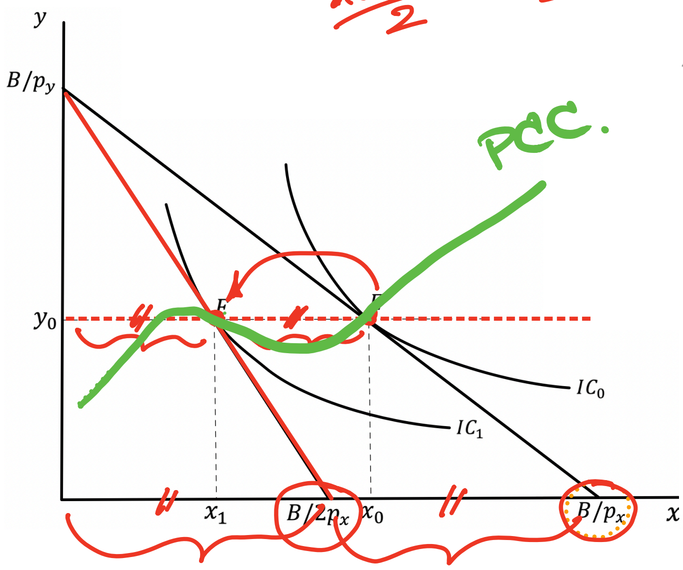
1. A ~~PPC~~ PCC does not pass through the origin.
2. If a ~~PPC~~ PCC is created by varying p_x while keeping p_y and income B constant, we will get a different PPC with a change in p_y and/or B.
3. A PCC can be created from varying p_y while keeping p_x and B constant.
4. Any two points on a given PCC can give the price elasticity of the product whose price is varying. We will discuss next for the case when p_x changes.

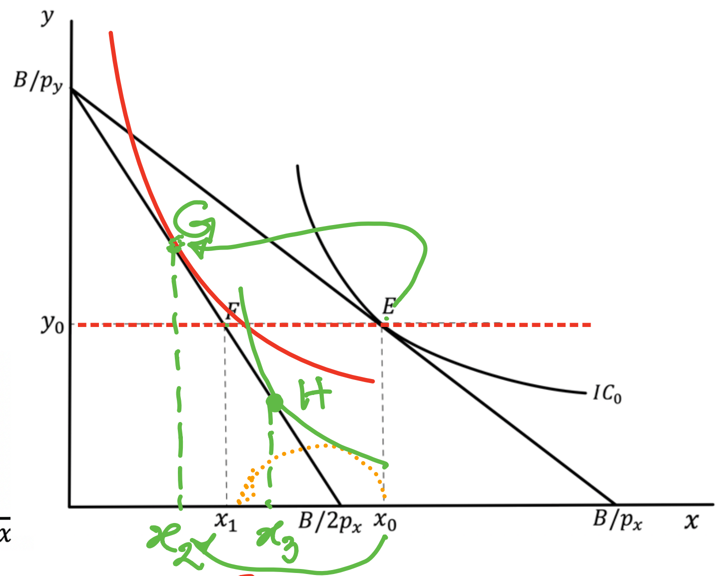
Question: Can 2 PCC's (varying P_x) be tangent or intersect to each other?

Any two points on a given PCC can give the price elasticity of *x* (p_y and B are constant)%

Let assume that we have two equilibrium points E and F being on a same PCC when p_x changes and p_y and B are constant in such a way that the line passing through them is parallel to the horizontal axis. For ease of exposition, assume that E is on a budget line $p_x x + p_y = B$, while F is on a budget line with the income $2p_x x + p_y = B$.

$\frac{x_0 + 2x_0}{2} = \frac{3}{2} x_0.$





We will compute the price elasticity of x by midpoint method,

$P_0 = P_x$
$P_1 = 2P_x$

$x_1 = \frac{x_0}{2}, \; x_0$

$\Delta P_x = 2P_x - P_x = P_x$

$\frac{P_1 + P_0}{2} = \frac{2P_x + P_x}{2} = \frac{3}{2} P_x$

$$\%\Delta p_x = \frac{\Delta P_x}{(3/2)P_x} = \frac{P_x}{3/2\, P_x} = 2/3.$$

$$\Delta x = x_1 - x_0 = -\frac{x_0}{2} = \%\Delta x = \frac{-\frac{x_0}{2}}{\frac{3}{4} x_0} = -\frac{2}{3}$$

$$\frac{x_1 + x_0}{2} = \frac{\frac{x_0}{2} + x_0}{2} = \frac{3}{4} x_0.$$

$$\eta_x = \frac{\%\Delta x}{\%\Delta p_x} = \frac{-2/3}{2/3} = -1.$$

Where should the new equilibrium be for the price elasticity to be ***less than one*** in absolute value?

Where should the new equilibrium be for the price elasticity to be ***more than one*** in absolute value?

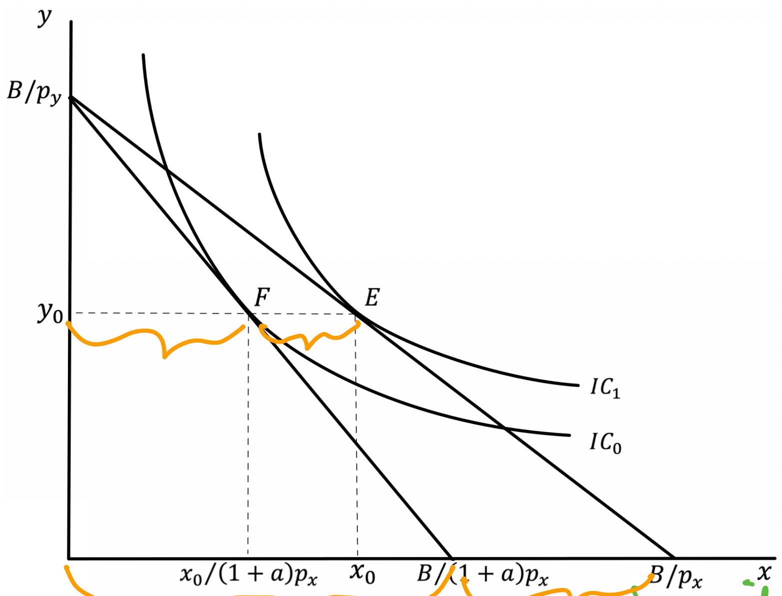
from E to G we can see that $|\eta_x| > 1$.

from E to H, $|\eta_x| < 1$.

$p_x \to 2p_x$

$p_x \to (1+a)p_x \quad a > 0.$

- The following graph demonstrates the case when the price p_x changes to $(1+a)p_x, a > 0$.



by midpoint method.

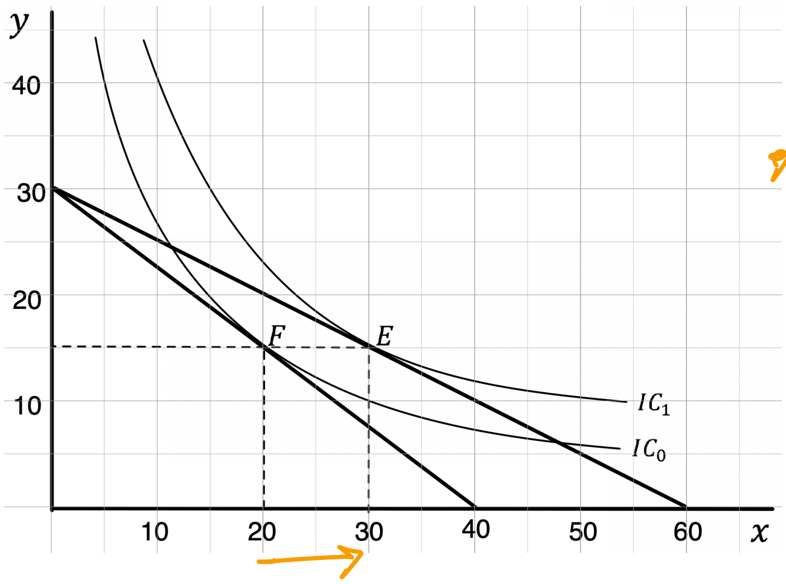
We can calculate the price elasticity of x as follows:

$$\%\Delta p_x =$$
$$\%\Delta x =$$
$$\eta_x = \frac{\%\Delta x}{\%\Delta p_x} =$$

Since the calculation of price elasticity is by midpoint method, we have the same conclusion when price p_x decreases.

Example: If the price p_x decreases from 3 to 2 so that we have budget line changes from

$$3x + 4y = 120 \text{ to } 2x + 4y = 120,$$



$P_x = 3 \rightarrow P_x' = 2.$

$\Delta P_x = 2 - 3 = -1.$

$\% \Delta P_x = \frac{-1}{(3+2)/2} = -\frac{2}{5}.$

$x_1 = 30 \rightarrow x_0 = 20.$

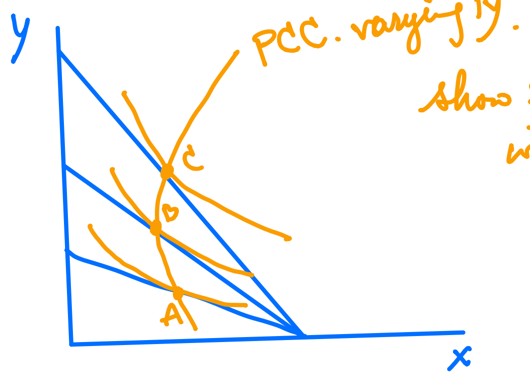
$\Delta x = x_1 - x_0 = 30 - 20 = 10$

$\% \Delta x = \frac{10}{(30+20)/2} = \frac{2}{5}.$

Calculation of price elasticity of x:

$$\% \Delta p_x = -2/5$$
$$\% \Delta x = 2/5$$
$$\eta_x = \frac{\% \Delta x}{\% \Delta p_x} = \frac{2/5}{-2/5} = -1$$

HW: Demonstrate how PCC with varying p_y (fixed p_x and B can give us the price elasticity of y to be in absolute value equal to 1, less than 1 and greater than 1.



show 2 points on PCC that will cause $|\eta_y| = 1$
> 1
< 1