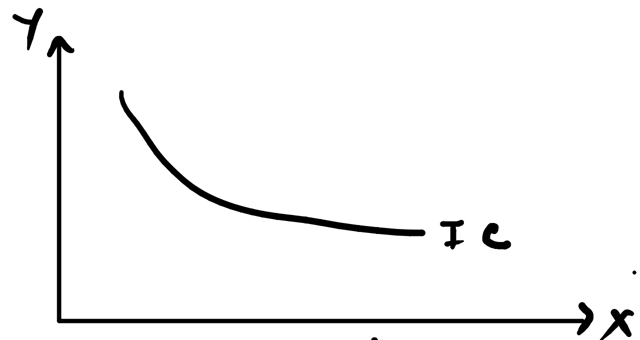
27 December 2023 07:17 PM

① IC is convex to the origin

① Convex set → concavity

↓

Convexity (convex preference)



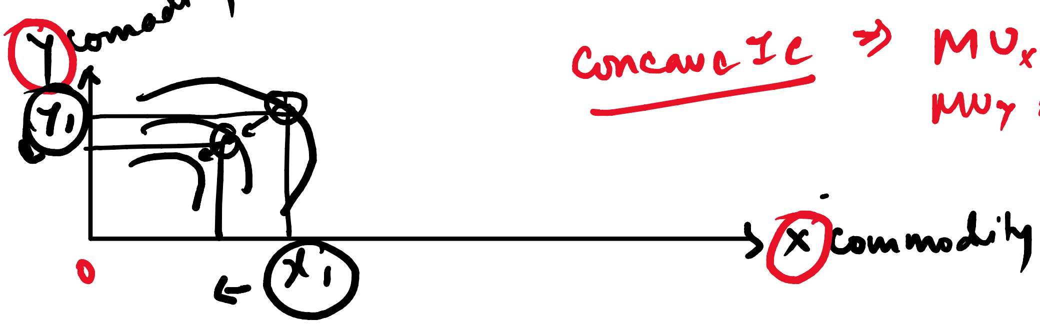
Both x and Y are good commodity

$MU_x > 0$

$MU_y > 0$

② Linear IC

③



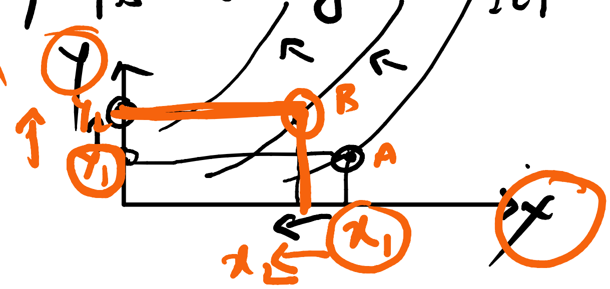
Concave IC ⇒ MU_x is -ve, MU_y is +ve.

$MU_x = \frac{\partial U}{\partial x} < 0$

④ Commodity x is a bad ~~good~~ commodity → $MU_x < 0$

Commodity y is a good commodity → $MU_y > 0$

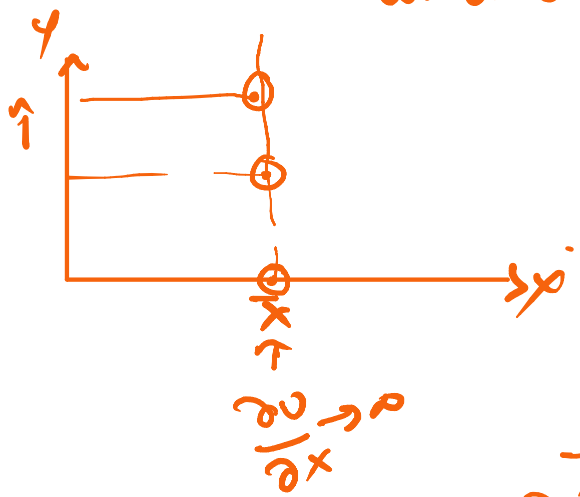
good $MU > 0$



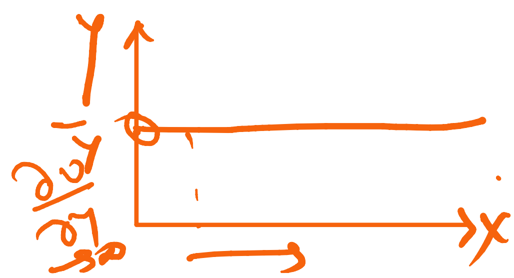
Convex & upward

Bad $MU < 0$

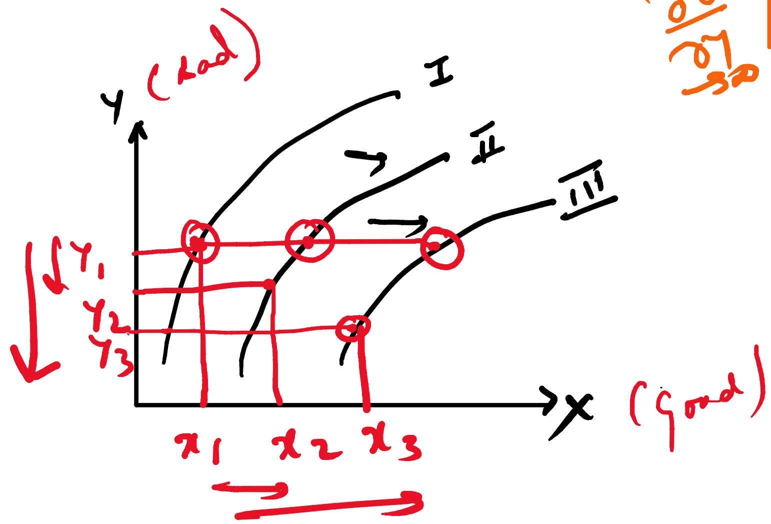
⑤ Vertical IC (commodity x is fixed at $\bar{x}$ and consumption of y increases)

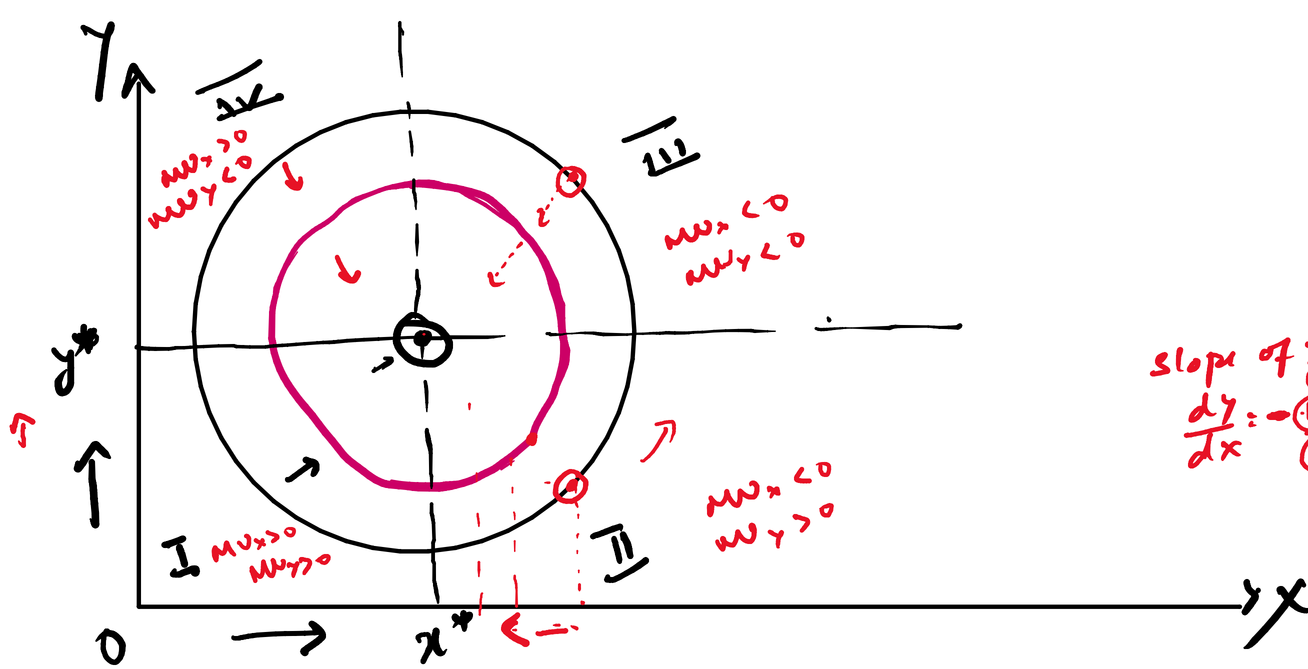


⑥ Commodity of y is fixed. Horizontal IC.



⑦





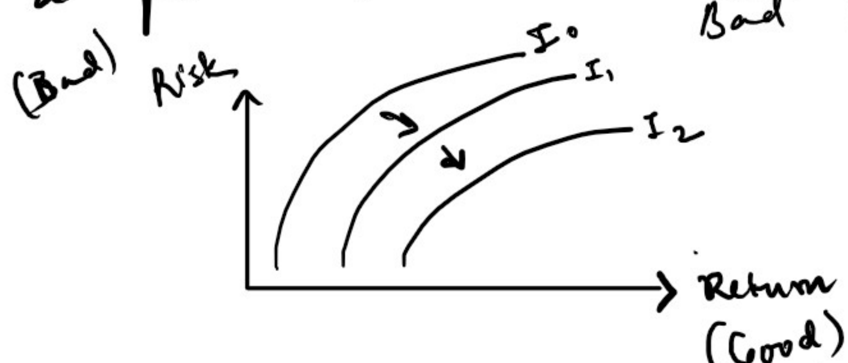
slope of IC

$\frac{dy}{dx} = -\frac{MU_x}{MU_y} < 0$

Zone	X comm	Y comm	Slope of IC
I	Good	Good	$MU_x > 0$ $MU_y > 0$ slope of IC (-ve) and convex to origin
II	Bad	Good	$MU_x < 0$, $MU_y > 0$ slope of IC (+ve)
III	Bad	Bad	$MU_x < 0$ $MU_y < 0$ slope of IC (-ve), concave to origin
IV	Good	Bad	$MU_x > 0$ $MU_y < 0$ slope of IC (+ve).

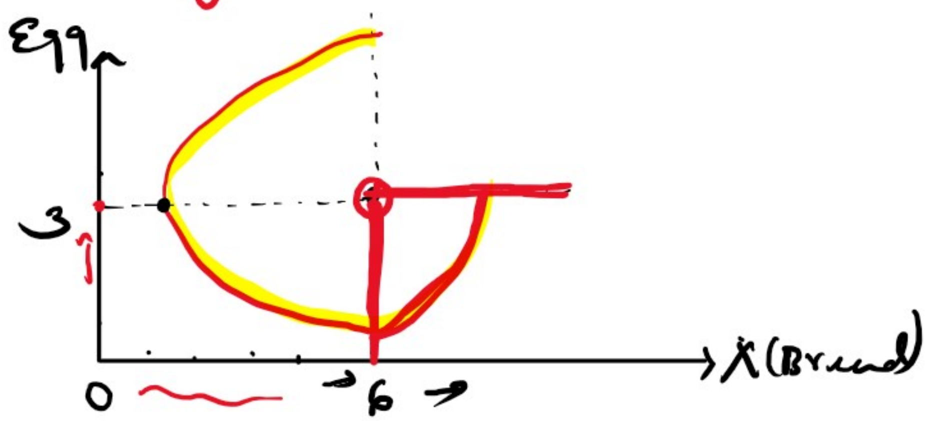
Q1 Construct a set of ICs in each of the following two cases,

(i) a person doesn't like risk but like return.
Bad Good

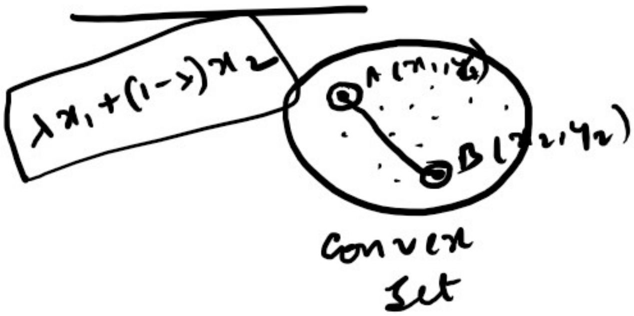


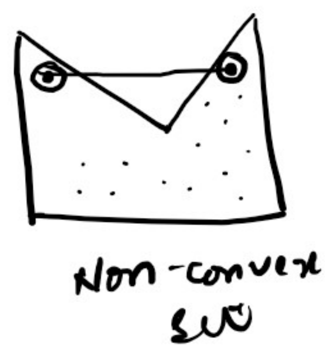
Here we assume return is a good commodity for which MU_x is positive but risk is a bad commodity for which MU of risk -ve. So ICs look like +vely sloped.

(ii) A consumer likes both bread and egg, but believes that beyond 6 slices of bread a day it is bad and beyond 3 eggs believes that beyond 6 [illegible] day it is bad and beyond 3 eggs a day it is bad.

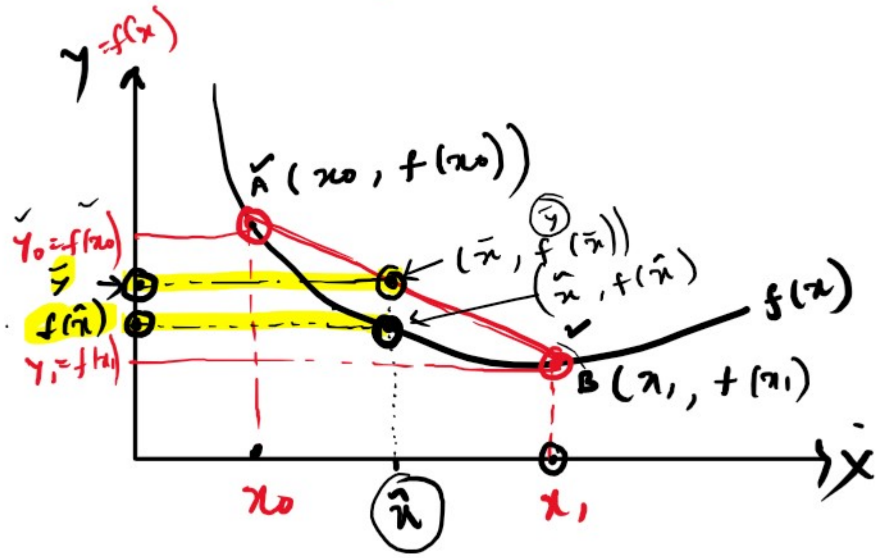


Convex Set





$y = f(x)$



There is an interval (a, b) upon which x_0 and x_1 is defined such that such that $x_0, x_1 \in I$

Now convex combination of x_0 and x_1 is given by

$$\boxed{\hat{x} = \lambda x_1 + (1-\lambda) x_2}$$

for any $\lambda \in [0,1]$

By cross sectional formula

$$\bar{x} = \frac{\lambda x_0 + (1-\lambda)x_1}{\lambda + (1-\lambda)}$$

$$\bar{y} = \frac{\lambda f(x_0) + (1-\lambda) f(x_1)}{\lambda + (1-\lambda)}$$

∴ The coordinates of $(\bar{x}, \bar{y})$ are $\left(\lambda x_0 + (1-\lambda)x_1, \ \lambda f(x_0) + (1-\lambda) f(x_1)\right)$

Again $f(\hat{x}) = f(\lambda x_0 + (1-\lambda) x_1)$

Comparing $\bar{y} = f(\bar{x})$ and $\hat{y} = f(\hat{x})$

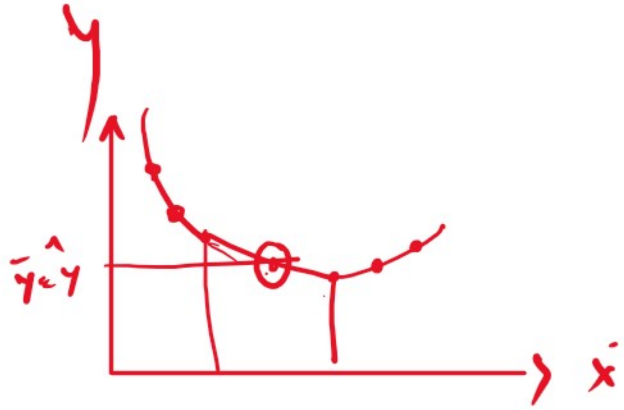
$$f(\bar{x}) > f(\hat{x})$$

$$\lambda f(x_0) + (1-\lambda) f(x_1) > f(\lambda x_0 + (1-\lambda) x_1)$$

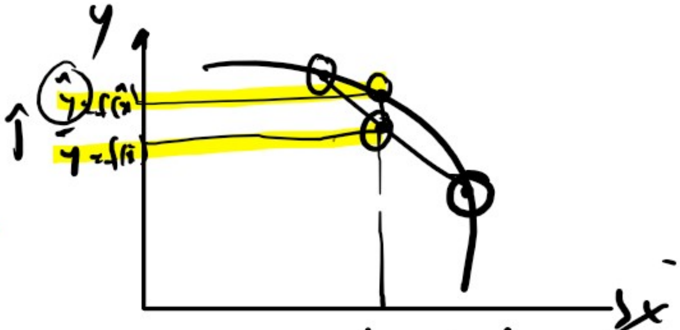
This called strictly convex function

$\geq$

y weak convexity function.



weak convexity funtion.



Strict concavity def

$f(\lambda x_0 + (1-\lambda)x_1) > \lambda f(x_0) + (1-\lambda) f(x_1)$