

## Week 5

Tuesday, 27 February 2024 18:03

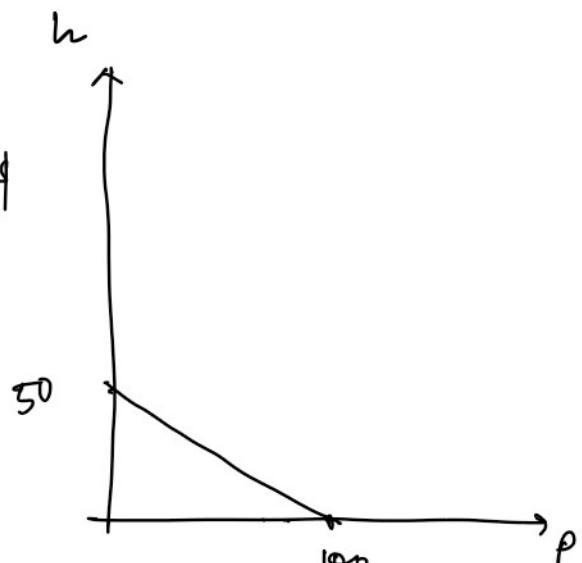
Week 4, Q4

$$p_1 = 3 \text{ £} \quad p_2 = 6 \text{ £} \quad I = 300 \text{ £}$$

Budget constraint

$$p_1 P + p_2 W = 300$$

$$3P + 6W = 300$$



~~Q5~~ Axioms of Rationality

Reflexivity  $x \sim x$

Transitivity

$$x \succ y \wedge y \succ z \Rightarrow x \succ z \quad \text{yellow box}$$

$$A \succ B \quad B \succ G \Rightarrow A \succ G$$

$$S = \{A, O, G, P, B\}$$

Completeness

$$P \succ A$$

$$A \succ G$$

$$G \succ O$$

$$B \sim G$$

1

$$S = \{ \overset{A}{apple}, \overset{O}{orange}, \overset{G}{grape}, \overset{P}{pineapple}, \overset{B}{banana} \}$$

⇒ Consumption set

$$S_1 = \{ \overset{(A,B)}{(A,B)}, \overset{(B,G)}{(B,G)}, \overset{(B,O)}{(B,O)}, (B,B), (B,O) \}$$

$$(A,B)$$

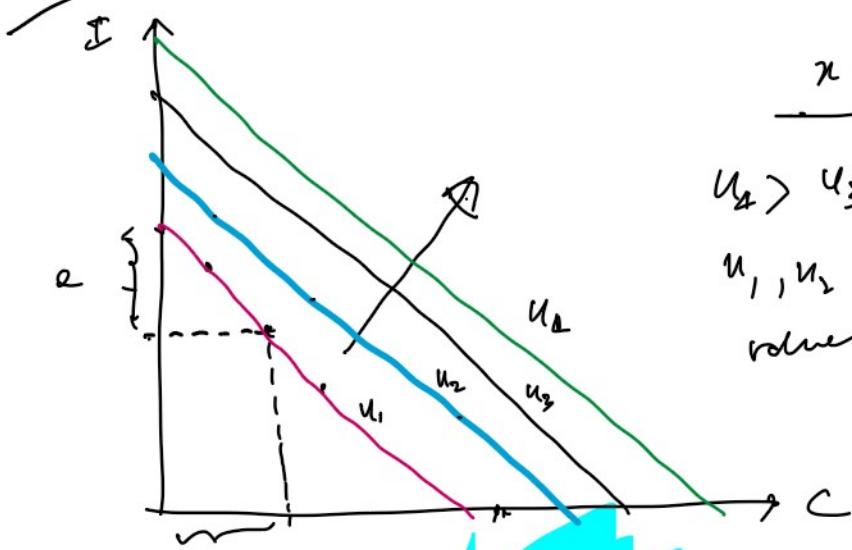
$$(B,G)$$

$$S_2 = \{ (a,b,c,d), (e,f,g,h), (\dots), (\dots) \}$$

$$R : X$$

$$X = \{ x, y, z, P, Q \}$$

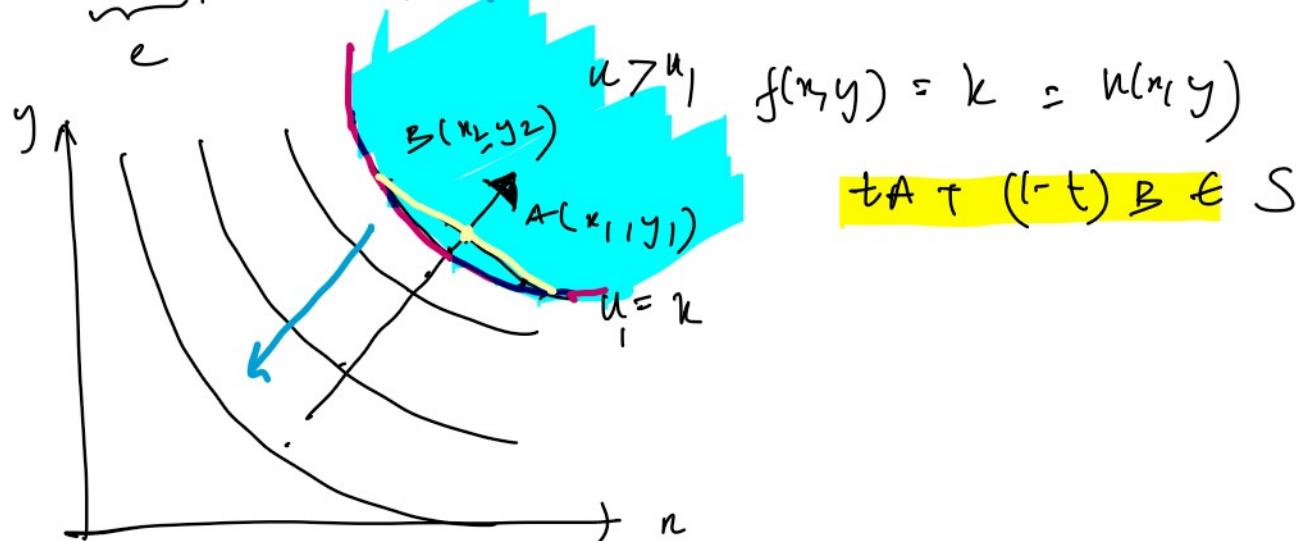
Reflexivity  $xRx \in X$   
 Completeness  $\forall x, xRy \in X$   
 Q2<sup>3</sup> Alina likes icecream & chocolates equally.



$$x + y = k$$

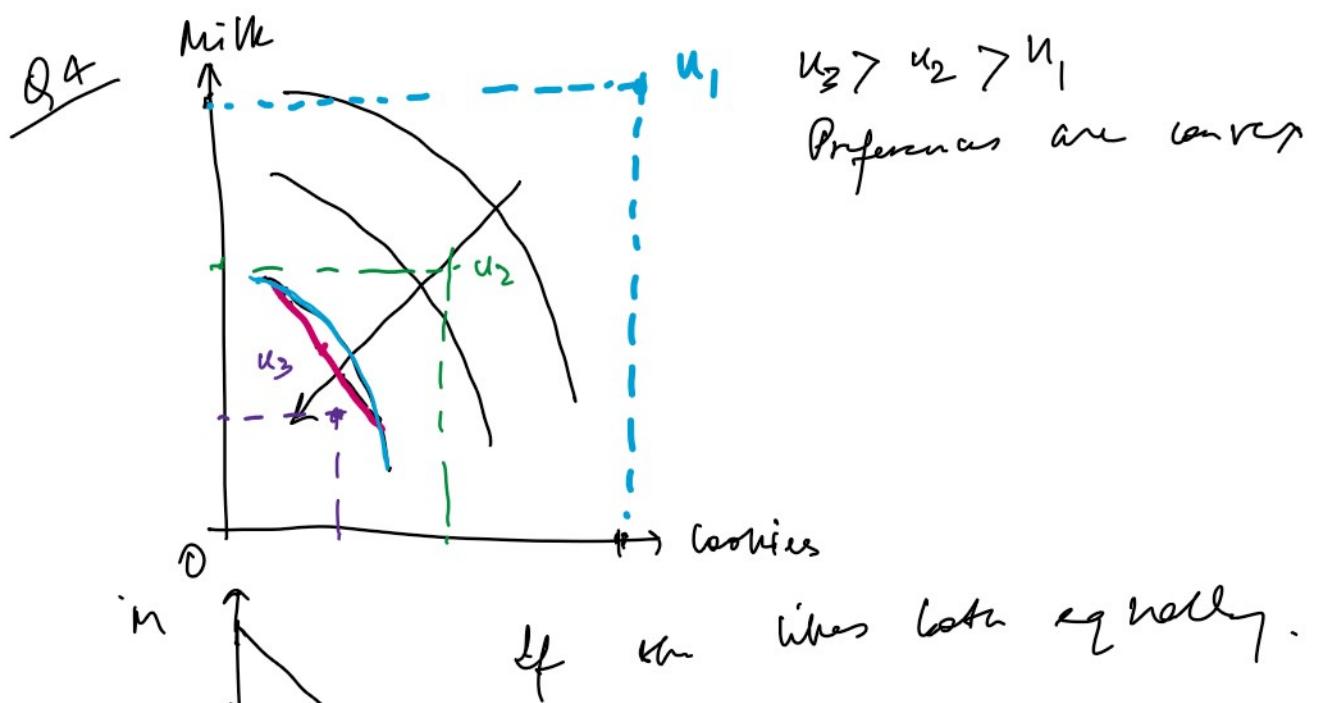
$$u_4 > u_3 > u_2 > u_1$$

$u_1, u_2, u_3, u_4$  are different values of  $k$ .



$$f(x, y) = k = u(x, y)$$

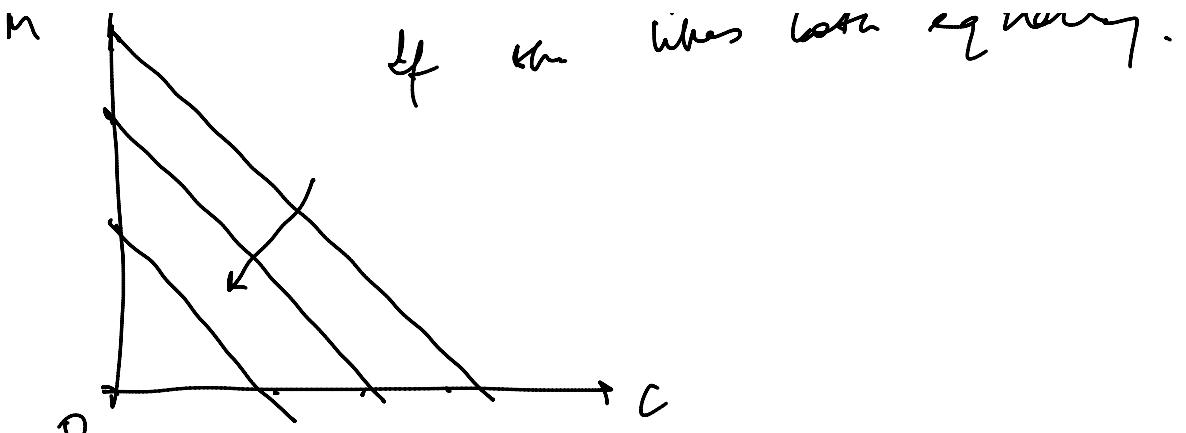
$$tA + (1-t)B \in S$$



$$u_3 > u_2 > u_1$$

Preferences are convex

If  $x_m$  likes both equally.



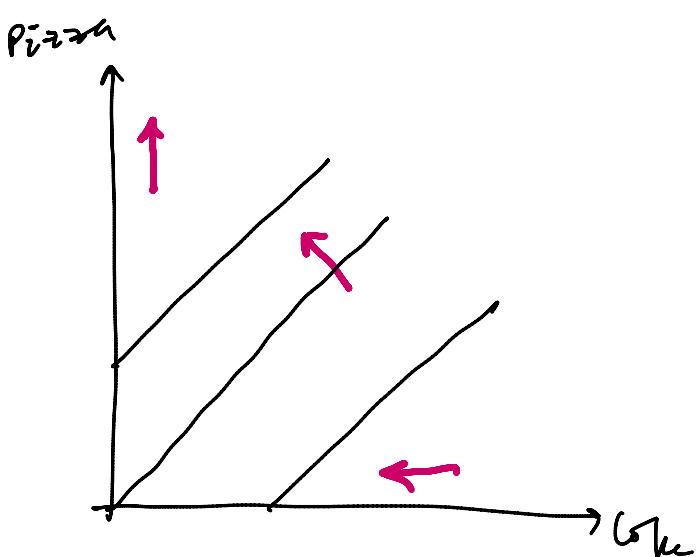
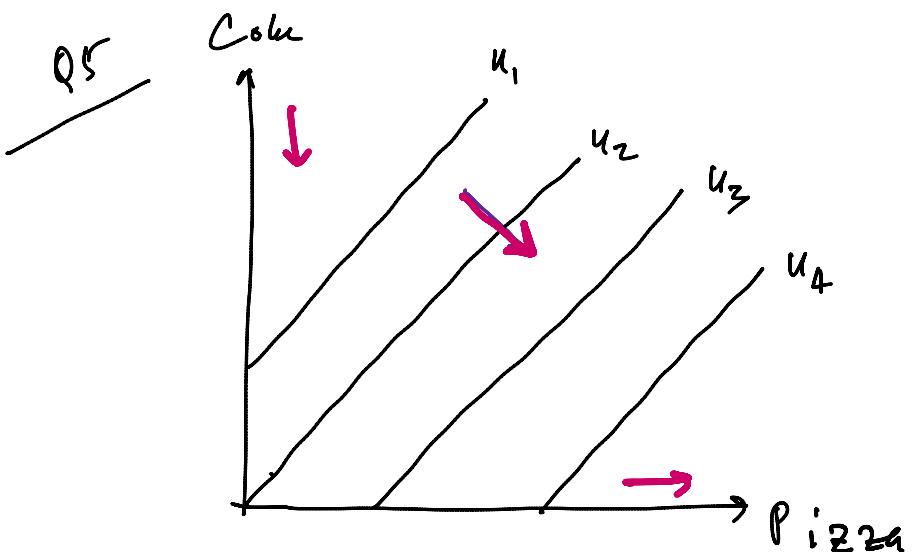
If  $x + c$  lies both  $\infty$  many.

$$u_1 > u_2 > u_3 > u_4$$

$$y = x + c$$

$$y - x + c = k$$

$$u(x, y) \in y - x + c$$



~~Q5~~  $C = \{(a, b), (b, c), (a, c), (b, a), (a, a)\}$

$$a, b, c, d \in \mathbb{R}^+$$

If  $(d, c) \in C$ , then completeness is violated.

$$\left\{ \begin{array}{l} (a, b) \geq (c, c) \\ (b, c) \leq (a, c) \\ (b, d) \sim (d, a) \end{array} \right.$$

$$\begin{matrix} (a, b) & (c, c) & (b, a) \\ (a, c) & \nearrow & \\ (b, c) & \rightarrow & (d, a) \end{matrix}$$

$\Rightarrow (b, c) \sim_{1d \sim 1} \checkmark$

$$\left\{ \begin{array}{l} (b, d) \sim (d, a) \\ (d, a) \succ (a, c) \\ (b, c) \succ (d, a) \end{array} \right. \quad \rightarrow \overbrace{\begin{array}{l} (b, c) \\ (d, a) \end{array}}^{\begin{array}{l} \text{green} \\ \text{green} \end{array}} \quad \underbrace{\begin{array}{l} (d, a) \succ (a, c) \succ (b, c) \\ (b, c) \succ (d, a) \end{array}}_{\text{green}}$$

Transitivity is violated.

Q7  $V(x, y) = (u(x, y))^2 + \alpha$   $\alpha > 0$

$$(x_1, y_1) \succ (x_2, y_2) \quad u(x_1, y_1) > u(x_2, y_2)$$

$$u(x, y) \approx x \cdot y$$

$$u_1 = 2 \quad x_1 = 1, \quad y_1 = 2$$

$$u_2 = 8 \quad x_2 = 2, \quad y_2 = 4$$

$$u_3 = 15 \quad x_3 = 3, \quad y_3 = 5$$

$$V(x, y) = xy^2 = (u(x, y))^2$$

$$v_1 = (1 \cdot 2)^2 = 4$$

$$v_2 = (2 \cdot 4)^2 = 64$$

$$v_3 = (3 \cdot 5)^2 = 225$$

$$W(x, y) = (xy)^2 + 1 = (u(x, y))^2 + 1$$

$$w_1 = 5$$

$$w_2 = 64$$

$$w_3 = 225$$

$$w_3 > w_2 > w_1$$

$$v_3 > v_2 > v_1$$

$$u_3 > u_2 > u_1$$

$$\begin{aligned} V &= (xy)^2 + \kappa \\ u &= xy \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} x \text{ Not monotonic}$$