1 Review

Same birthday as (on the set of people)

Is this relation:

Reflexive?

yes, *since every person has the same birthday as themselves.*

Complete?

no, since you can find a pair of people that do not have the same birthday. $a \not R b$ and $b \not R a$.

Transitive?

Anytime aRb and bRc then aRc. This is transitive.

Symmetric?

Whenever aRb then bRa. (it holds in either zero or two directs, but never just one) yes

Asymmetric?

Whenever aRb then $b \not R a$ (it holds in at most one direction)

1.1 Checking Formal Relations

Consider the following preference relation on the set $\{a, b, c\}$.

$$a \succsim a, b \succsim b, c \succsim c, a \succsim b, b \succsim c, c \succsim a$$

Is this a relfexive preference relation?

Yes.

Is it complete?

Yes.

Provide an example of why this relation is **not transtive**.

Since $a \succsim b, b \succsim c$ but $a \succsim c$ does not appear, this is a violation of transitivity.

1.2 Another Example

Consider the following complete and transitive preference relation:

$$a \succsim a, b \succsim b, c \succsim c, a \succsim b, a \succsim c, b \succsim a, b \succsim c$$

What is the indifference relation $\sim$ for this consumer?

$$a \sim a, b \sim b, c \sim c, a \sim b$$

What is the strict preference $\succ$ relation for this consumer?

$$a \succ c, b \succ c$$

Write the preference relation in chain notation.

$$a \sim b \succ c$$

What is **best** from the set $\{a, c\}$? a

What is **best** from the set $\{a, b, c\}$? a, b

$$a \succsim a, b \succsim b, c \succsim c, a \succsim b, a \succsim c, b \succsim a, b \succsim c$$

Write a utility function that represents this preference relation.

$$a \sim b \succ c$$

$$u(a) = 10, u(b) = 10, u(c) = 5$$

$$u(a) = 10, u(b) = 10, u(c) = 0$$

Given the utility function $u(a) = 5, u(b) = 10, u(c) = 10$ write the preference relation (in chain notation).

$$b \sim c \succ a$$

1.3 MRS

$min\left\{x_1,x_2\right\}$ there is no MRS.

ax_1+bx_2 the mrs is $-\frac{a}{b}$ for example $(3x_1+2x_2)$ mrs $-\frac{3}{2}$.

$x_1^a x_2^b$ the mrs is $-\frac{\frac{a}{a+b}}{\frac{b}{a+b}}\frac{x_2}{x_1}$

$$x_1^2x_2$$

$$MU_1=\frac{\partial\left(x_1^2x_2\right)}{\partial x_1}=2x_1x_2$$

$$MU_2=\frac{\partial\left(x_1^2x_2\right)}{\partial x_2}=x_1^2$$

$$MRS=-\frac{2x_1x_2}{x_1^2}=-2\frac{x_2}{x_1}$$

$$x_1^2x_2$$

$$-\frac{\frac{2}{3}}{\frac{1}{3}}\frac{x_2}{x_1}=-2\frac{x_2}{x_1}$$

quasi-linear

$$ln\left(x_1\right)+x_2$$

$$MU_1=\frac{1}{x_1}$$

$$MU_2=1$$

$$MRS = -\frac{\frac{1}{x_1}}{1} = -\frac{1}{x_1}$$

$$x_1 + ln\left(x_2\right)$$

$$MRS = -\frac{1}{\frac{1}{x_2}} = -x_2$$

$x_1 x_2$

$x_1^2 x_2^2$

$$MRS = -\frac{x_2}{x_1}$$

Suppose $(4, 3) \succ (5, 3)$ this shows that the preference violate _ _ _ _ _ _ _ _ _ _.

$u\left(x_1, x_2\right) = 5x_1 - x_2$

Find two bundles that demonstrate this is not monotonic.

$$(1, 0) \succ (1, 1)$$

$(2, 0), (0, 2)$

$\left(t\left(x_1\right) + (1-t)\, y_1, tx_2 + (1-t)\, y_2\right)$

for $t = \frac{1}{2}$ $(1, 1)$

If $(2, 0), (0, 2)$ then convexity requries that

$(1, 1) \succsim (2, 0)$ and $(1, 1) \succsim (0, 2)$.

2 Sketching Indiffernce Curves

$u(x_1, x_2) = 3x_1 + 2x_2$

$$mrs = -\frac{3}{2}$$

What the utility of $(5, 5)$?

$$3 * 5 + 2 * 5 = 25$$

Sketch the set of bundle indifferent to the bundle $(5, 5)$?

What are all of the budnles that give utility 25?

$$3x_1 + 2x_2 = 25$$

$$x_2 = \frac{25}{2} - \frac{3}{2}x_1$$

$u(x_1, x_2) = min\left\{\frac{1}{2}x_1, x_2\right\}$

Line of no waste:

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