Hi All! I will have music playing in the background at least until 10am so that people can test their speakers.
Hey, if you hate my music you might want to turn off the volume until then. :)

If you need to play with the controls the menu next to “Start Video” has a option “Video Settings…” and then then there is an “Audio” tab where you can test speakers/microphone

When you come into the meeting your microphone should by default be mute

You may communicate by

1. the chat
2. signals of yes/no/faster/slower/thumbs up/thumbs down/etc.
3. you may unmute your microphone (but remember to mute again when you finish speaking)
4. I think that there is an option to annotate the screen (see if you can find the controls and draw on the screen)

Plan for today:

1. examples of reflexive/transitive/symmetric
2. equivalence relations and equivalence classes

We will start with this question from last time:

R6 = { (x,x) : x in Z } is it reflexive, symmetric and/or transitive? If so why or why not?

Welcome! If you are not speaking, please mute your microphone to reduce the background noise. You may communicate by chat/symbols/or microphone

Remember this question from last time?

R6 = { (x,x) : x in Z } is it reflexive, symmetric and/or transitive? If so why or why not?

Yes this is reflexive. Because (x,x) in R6 for all x in Z

Yes this relation is symmetric. It is because if (x,y) in R6, then x=y.
and if x=y then (y,x) = (x,x) in R6

This relation is transtive because if (x,y) and (y,z) are in R6, then x=y and y=z
so (x,z) = (x,x) and this is in R6.

Recall:

A relation on a set D, is a set of pairs (x,y) where x and y are both in D.
A relation R is reflexive if (x,x) is in R for all x in D.
A relation R is symmetric if (x,y) is in R, then (y,x) is in R.
A relation R is transitive if (x,y) and (y,z) is in R, then (x,z) is in R.

I will put up a poll in a few minutes asking what people think about the relation R6 (whether they think it is reflexive, symmetric and transitive). This poll will be anonymous.

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R7 = { (x,y) : if x<= y where x,y in Z }

is it reflexive, symmetric and/or transitive? If so why or why not?

R7 is reflexive. The reason is that x<=x and so (x,x) in R7.

R7 is not symmetric. Because if 1<=2, then 2 is not <= 1

R7 is transitive because if x<=y and y<=z, then x<=z.

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R8 = { (x,y) : if |x-y| <= 1 where x,y in Z }

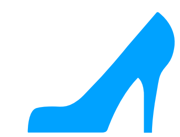
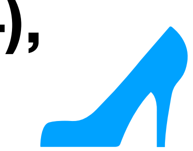
is it reflexive, symmetric and/or transitive? If so why or why not?

R8 is reflexive because |x-x|=0<=1

R8 is symmetric because |x-y|=|y-x| and so if |x-y|<=1, then |y-x|<=1

R8 is not transitive. |1-2|=1<=1 also |2-3|=1<=1 BUT |1-3|=2>1

D = {1,2,3,4} **Find a relation that fits in the table**

	reflexive	symmetric	transitive
R1 = { (1,2) , (1,1), (2,3) }			
R2 ={(1,1) (2,2) (3,3) (4,4),(1,2),(2,3)}			
R3 = {(1,2), (2,1)}			
R4 = {(1,2), (2,3), (1,3)}			
R5 = {(x,y): |x-y|<=1, x,y in {1,2,3,4}}			
R6 = {(1,1), (1,2), (2,2), (3,3), (4,4)} or {(x,y): x<=y, where x,y in D}			
R7 = {(1,2) , (2,1) , (1,1), (2,2)}			
R8 = {(1,1),(1,2),(1,3),(1,4),(2,1),(2,2),(2,3),(2,4),(3,1),(3,2),(3,3),(3,4),(4,1),(4,2),(4,3),(4,4)} or {(1,1),(2,2),(3,3),(4,4)}			

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A relation R is an equivalence relation if it is reflexive, symmetric and transitive

If *a* is an element of D, then the equivalence class of *a* is

[a] := { b : b in D and (a,b) in R }

Example:

$$R = \{(a, b) : a, b \in \mathbb{Z}, a \equiv b \ (mod \ 5)\}$$

R = {(a,b) where 5 divides a-b}

[1]:={…,-14,-9,-4,1,6,11,16,21,….}

[2]:= {…,-13,-8,-3,2,7,12,17,22,….}

[3]:={….,-12,-7,-2,3,8,13,18,23,….}

[4]:={…,-11,-6,-1,4,9,14,19,24,…}

[5]:={…,-10,-5,0,5,10,15,20,25,…}

Every element in D appears in exactly one equivalence class

All different equivalence classes are disjoint

The following are examples of equivalence relations on the complex numbers

$$R_1 = \{(x, x) : x \in \mathbb{C}\}$$

$$R_2 = \{(x, y) : Re(x) = Re(y), x, y \in \mathbb{C}\}$$

$$R_3 = \{(x, y) : Im(x) = Im(y), x, y \in \mathbb{C}\}$$

$$R_4 = \{(x, y) : |x| = |y|, x, y \in \mathbb{C}\}$$

$$R_5 = \{(x, y) : ax = y \text{ for some } a > 0, a \in \mathbb{R}, x, y \in \mathbb{C}\}$$

$$R_6 = \{(x, y) : ax = y \text{ for some } a \neq 0, a \in \mathbb{R}, x, y \in \mathbb{C}\}$$

if x = a+bi where a and b are real
then Re(x) = a and Im(x) = b