

CIT 5920 — Lecture 6: Introduction to counting

19 - 19 Sep 2024

Poll results

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- What is the pacing like for you right now?
- How do you want to start this lecture? (Select all options you would be okay with.)
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What is the pacing like for you right now?

0 2 9

Way too fast

0 %

A bit too fast

24 %

Just right

55 %

A bit too slow

21 %

Way too slow

0 %

How do you want to start this lecture? (Select all options you would be okay with.)

032

No quiz



Quiz on relations



Quiz on functions



Quiz: Real-Life Relations (1/6)

036

Which relation is typically NOT transitive? Pick all that apply.

"is older than"



"finds attractive" ✓



"is smaller than"



"has met with" ✓



Which relation is typically transitive?

"is a friend of"

☐ 3 %

"is an ancestor of" ☒

☒ 93 %

"has worked with"

☐ 3 %

"has shaken hands with"

☐ 3 %

Quiz: Real-Life Relations (3/6)

038

Which of the following relations is NOT reflexive?

"is an Instagram follower of" ✓



"is a Facebook friend of" ✓



"shares the same birthday as"



Which relation is both reflexive and symmetric?

"is a sibling of"

 13 %

"is a rival of"

 0 %

"lives in the same neighborhood as" ✓

 72 %

"is the same age or older than"

 16 %

Which relation is typically symmetric?

"is a fan of"

☐ 0 %

"is a child of"

☐ 0 %

"is a friend of" ✓

☒ 55 %

"has spoken to" ✓

☒ 45 %

Quiz: Real-Life Relations (6/6)

033

Which of the following relations is reflexive and transitive but NOT symmetric?

has the same hair color as

☐ 0 %

"has the same favorite color as"

☐ 6 %

"is the same age or older than" ☒

☒ 88 %

"has met"

☐ 6 %

Quiz: Functions (1/13)

043

Which of the following relations is NOT symmetric?

"is a sibling of"

☐ 2 %

"is a parent of" ☒

☒ 98 %

"is a friend of"

☐ 0 %

"has the same birthday as"

☐ 0 %

Quiz: Functions (2/13)

033

If $A = \{1, 2, 3\}$ and $B = \{4, 5, 6\}$, and the relation R consists of tuples where $b = a + 3$, what is R ?

$\{(1,4), (2,5), (3,6)\}$ ✓

 100 %

$\{(1,5), (2,6), (3,7)\}$

 0 %

$\{(1,2), (2,3), (3,4)\}$

 0 %

$\{(1,3), (2,4), (3,5)\}$

 0 %

If a relation is anti-symmetric, which of the following is true?

aRb implies bRa

☐ 0 %

aRb and bRa can only be true if $a = b$ ✓

☒ 82 %

aRb and bRa are always true

☐ 8 %

aRb implies not bRa

☐ 10 %

Quiz: Functions (4/13)

0 4 1

A relation that is reflexive, symmetric, and transitive is called:

Reflexive relation

☐ 0 %

Symmetric relation

☐ 0 %

Transitive relation

☐ 0 %

Equivalence relation ✓

☒ 100 %

Order relation

☐ 0 %

Quiz: Functions (5/13)

0 2 6

Which of the following is a necessary condition for a relation to be a function?

Every element of the domain is related to some element in the codomain.



 92 %

Some elements of the domain can be related to multiple elements in the codomain.

 0 %

Every element of the codomain is related to some element in the domain.

 8 %

No element of the domain is related to any element in the codomain.

 0 %

Quiz: Functions (6/13)

040

If $f(x) = x^2$, is this function one-to-one in the domain of REAL NUMBERS?

Yes



No ☒



Quiz: Functions (7/13)

0 4 2

If $f(x) = x^2$, is this function one-to-one in the domain of NATURAL INTEGERS?

Yes ✓



No

☐ 2 %

Quiz: Functions (8/13)

037

If $f(x) = x^2$, is this function one-to-one in the domain of ALL INTEGERS?

Yes

☐ 3 %

No ☒

☒ 97 %

Quiz: Functions (9/13)

036

Which of the following functions has a range that is a subset of its codomain?

$f(x) = x^2$, where x is a real number ✓



$g(x) = 2x$, where x is a natural number



$h(x) = x/2$, where x is an integer



$j(x) = \sin(x)$, where x is a real number



The ceiling function, denoted as $\lceil x \rceil$, represents:

The smallest integer less than or equal to x

☐ 3 %

The largest integer less than or equal to x

☐ 17 %

The smallest integer greater than or equal to x ✓

☒ 77 %

The largest integer greater than or equal to x

☐ 3 %

Quiz: Functions (11/13)

0 4 0

If $f: X \rightarrow Y$ is a bijection, which of the following is true?

f is one-to-one but not onto

☐ 3 %

f is onto but not one-to-one

☐ 0 %

f is neither one-to-one nor onto

☐ 0 %

f is both one-to-one and onto ☒

☒ 98 %

Quiz: Functions (13/13)

0 3 5

Which of the following is an example of a bijection?

(1/2)

$f(x) = x^3$, where x is a real number ✓



$g(x) = x^2$, where x is a positive real number ✓



$h(x) = 1/x$, where x is a non-zero real number ✓



$h(x) = 1/x$, where x is a real number



$j(x) = e^x$, where x is a real number



Quiz: Functions (13/13)

0 3 5

Which of the following is an example of a bijection?
(2/2)

$j(x) = e^x$, where x is a positive real number

 54 %