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(C) more than one
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Surya Prajnapti: 7

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## Georg Cantor



Surya Prajnapti: 7
$\Rightarrow$ Infinity $\approx$ Number

$$
\approx \text { Property of a set }
$$

## Assumption 1. Infinite sets exist

How do you count an infinite set?

## When are two sets equal in size?

Assumption 2. Two sets are equal in size if all elements can be paired together

## $\Rightarrow$ Infinity $\approx$ Number

$\Rightarrow$ Number $\approx$ Property of a set

## Assumption 1. Infinite sets exist


0
0
0

0
0

0
0
-
-

0
-
-
-

0


## $\Rightarrow$ Infinity $\approx$ Number

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$\aleph_{0}=$ size of set of natural numbers $(1,2, \ldots)$

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An infinite number:
$\aleph_{0}=$ size of set of natural numbers $(1,2, \ldots)$
"Aleph-zero"

## [012:




$\aleph_{0}$ rooms
$\aleph_{0}$ guests

$\aleph_{0}$ rooms
$\aleph_{0}+1$ guests

## [0ा:


$\aleph_{0}$ rooms
$\aleph_{0}+1$ guests




## [1014



## [TOU:


$\aleph_{0}$ rooms
$2 \times \aleph_{0}$ guests

## COT:


$\aleph_{0}$ rooms
$2 \times \aleph_{0}$ guests

$\aleph_{0}$ rooms
$2 \times \aleph_{0}$ guests

## [TOIT: FOLC


$\aleph_{0}$ rooms
$2 \times \aleph_{0}$ guests

## [TOIT: FOLC



$$
2 \times \aleph_{0}=\aleph_{0}
$$

$\aleph_{0}$ rooms
$2 \times \aleph_{0}$ guests

## [OTIT:



$\aleph_{0}$ rooms
2 guests


$\aleph_{0}$ rooms
$2 \times 2$ guests


$\aleph_{0}$ rooms
$2 \times 2 \times 2$ guests


## COT:



## $\aleph_{0}$ rooms

$2 \times 2 \times 2 \times \ldots=2^{\aleph_{0}}$ guests
 now





## COT:



## $\aleph_{0}$ rooms

$$
2 \times 2 \times 2 \times \ldots=2^{\aleph_{0}} \text { guests }
$$

$$
2^{\aleph_{0}}>\aleph_{0}
$$

## More weird facts

$2^{\aleph_{0}}>\aleph_{0}$ but how big exactly?
$\Rightarrow$ undecidable!
$2^{x}>x$ true for any $x$ (Cantor)
$\Rightarrow$ there are always "igger infinittes!
The set of all infinities does not exist (Russell)
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Georg Cantor
(1845-1918)

