21-127 Concepts of Mathematics – EXCEL

Topic: Post-Exam Reflection, Cardinality, Finite/Infinite Sets

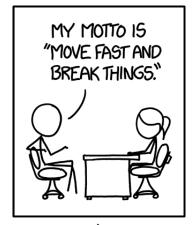
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Session Date: Mon 1 April 2019
Academic Development
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Services available: Supplemental Instruction (SI), Academic Counseling in Study Skills, Individual & Walk-in Tutoring

 $\{1, 2, 3\}$



JOBS I'VE BEEN FIRED FROM

FEDEX DRIVER
CRANE OPERATOR
SURGEON
AIR TRAFFIC CONTROLLER
PHARMACIST
MUSEUM CURATOR
WAITER
DOG WALKER
OIL TANKER CAPTAIN
VIOLINIST
MARS ROVER DRIVER
MASSAGE THERAPIST

Paired Notes Review

1.1 Let S be a set. If there exists a bijective function $f: S \to [n]$, then S is (finite/infinite).
1.2 Let S be a set. If for all natural numbers n there exists no bijective function $f: S \to [n]$, then S is (finite/infinite).
1.3 What are the two types of infinite sets?
1.4 Let S be a set. If there exists a bijective function $f: S \to \mathbb{N}$ then
1.5 Let S be a set. If there exists <i>no</i> bijective function $f: S \to \mathbb{N}$ then
1.6 For each of the following sets, state if it is finite, countably infinite, or uncountable. Explain why.

 \mathbb{N}

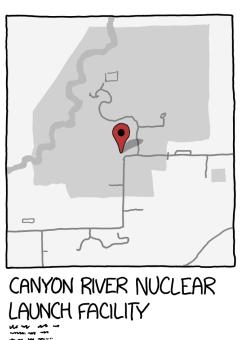
 \mathbb{R}

	Group Problem Solving
	"If you can't explain it to a six-year-old, you don't understand it yourself."
	"A mathematical theory is not to be considered complete until you have made it so clear that you can explain it to the first man whom you meet on the street."
	$ S \ge T $ if and only if there exists a/an
	$ S \le T $ if and only if there exists a/an
1.7	S = T if and only if there exists a/an

Off to the whiteboard!

2

Show that $\{0,1\}^{\mathbb{N}}$ is uncountable. 3



REVIEWS (22) -

★★★★★ GREATEST COUNTRY ON EARTH

★★☆☆☆ LOOKS COOL BUT YOU CAN'T GET IN

★☆☆☆ WHAT IS THIS STORE

★★★★☆ MY COUSIN WORKED HERE

★★☆☆☆ WAITSTAFF HEAVILY ARMED AND

VERY RUDE

★☆☆☆☆ STOP DOING CHEMITRAILS

★☆☆☆☆ THIS PLACE IS A SYMPTOM OF THE

MILITARY-INDUSTRIAL COMPLEX STRANGUNG OUR DEMOCRACY AND... (READ FULL REVIEW-1184 WORDS)

★★★☆☆ ANYONE ELSE NOTICE THE HOLE

IN THE WEST FENCE?

★★★★★ WHOA, MISSILES!

★★★☆☆ GOOD IDEA BUT CONFUSING WEB

SITE. HOW DO I PREORDER?

★☆☆☆☆ PLEASE DON'T LAUNCH THESE

I LOVE FINDING REVIEWS OF PLACES THAT REALLY DON'T NEED TO HAVE REVIEWS.

Review

4.1 Negate the following mathematical statements.

$$\circ \quad \forall a \in \mathbb{R}. \exists b \in \mathbb{R}. a + b \in \mathbb{Z}.$$

$$\circ \exists x \in \mathbb{Z}. \forall s \in \mathbb{N}. xs = s \lor xs = -s.$$

4.2 Prove the following statements, where *A*, *B* are sets.

$$\circ$$
 $A \cap B \subseteq A \cup B$

$$\circ \quad A^C \cup B^C = (A \cap B)^C$$

- 4.3 Prove, by induction, that a set of n elements has 2^n distinct subsets. $n \in \mathbb{N}$.
- 4.4* What is the maximum number of regions into which a plane can be divided by n straight lines? (Induction)
- 4.5 Construct a relation on N such that it is reflexive, symmetric, and *not* transitive.
- 4.6 Construct a relation on \mathbb{Z} such that it is *not* reflexive, symmetric, and transitive.

	8		9		1			
		2			7	3		
					6	2		7
	6	3					2	
	7			4			9	
	1					4	6	
9		8	7					
		1	2			9		
			1		4		7	