21-127 Concepts of Mathematics – EXCEL

Topic: **Post-Exam Reflection, Cardinality, Finite/Infinite Sets**
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Services available: Supplemental Instruction (SI), Academic Counseling in Study Skills, Individual & Walk-in Tutoring

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 *no* 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.

$\{1, 2, 3\}$ $\qquad\qquad$ $\mathbb{N}$ $\qquad\qquad$ $\mathbb{R}$

1.7 $|S| = |T|$ if and only if there exists a/an ____________________.

$|S| \leq |T|$ if and only if there exists a/an ____________________.

$|S| \geq |T|$ if and only if there exists a/an ____________________.

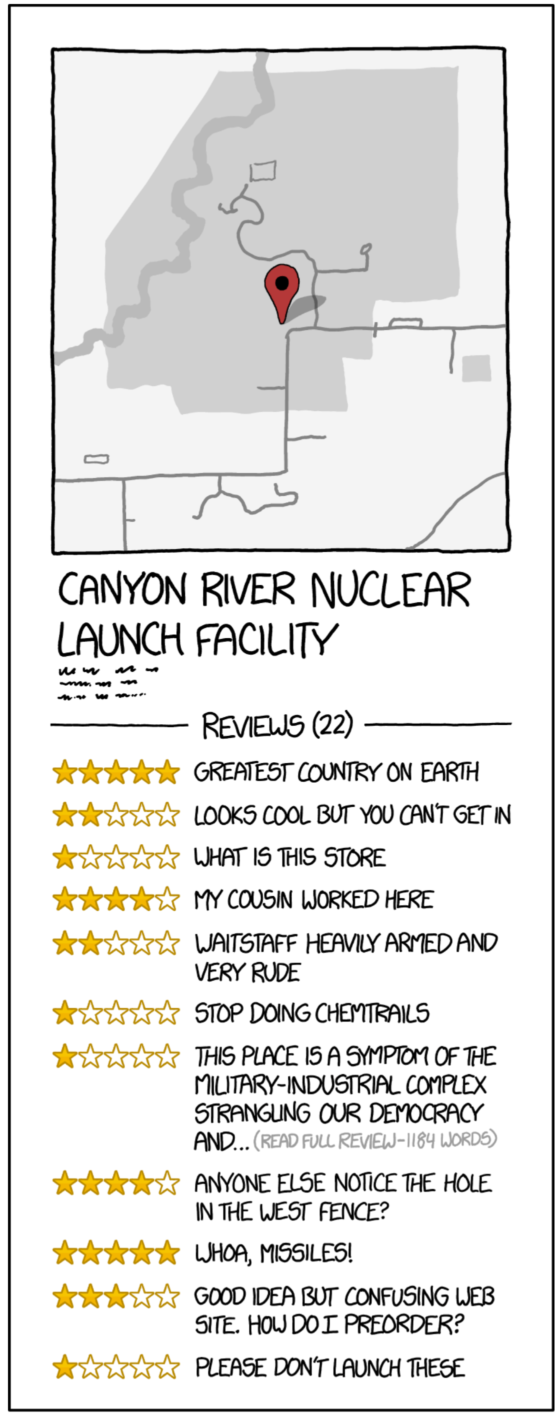
"A mathematical theory is not to be considered complete until you have made it so clear that you can explain it to the first man whom you meet on the street."

"If you can't explain it to a six-year-old, you don't understand it yourself."

Group Problem Solving

2 Off to the whiteboard!

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



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

Review

4.1 Negate the following mathematical statements.

- $\forall a \in \mathbb{R}. \exists b \in \mathbb{R}. a + b \in \mathbb{Z}.$
- $\exists x \in \mathbb{Z}. \forall s \in \mathbb{N}. xs = s \vee xs = -s.$

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

- $A \cap B \subseteq A \cup B$
- $A^C \cup B^C = (A \cap B)^C$

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 $\mathbb{N}$ 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.

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	6	3					2	
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