Concept Checking Paper 02

1. What is “math” based on all the math you have learned in your life?

2. Let $f{:}A \to B,\ g{:}B \to C$, prove that
   (i) If $g \circ f$ is injective, then f is injective
   (ii) If $g \circ f$ is surjective, then g is surjective

3. Write down the definition of **reflexive**, **in-reflexive**, **total**, **transitive**, **symmetric**, **antisymmetric**, **asymmetric**.

4. For which of the above properties does a **(not-strict) partial order** satisfy? What about a **strict partial order**? **Equivalence relation**? **Total order**?

5. State the two ways to construct real numbers in the slides.

6. Write down the definition of **equinumerous** between two sets and the corresponding notation.

7. Prove Cantor’s Theorem: For every set A, $A \not\approx P(A)$.

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