**Problem 1.** Let $A$ and $B$ be finite sets. How many functions are there from $A$ to $B$?
    A) $|A| + |B|$      B) $|A| \times |B|$      C) $|B|^{|A|}$      D) $|A|^{|B|}$      E) None of these

**Problem 2.** If $A$ and $B$ are *non-empty* sets then there is an injection from $A$ to $B$ if and only if there is a surjection from $B$ to $A$.
    A) True      B) False

**Problem 3.** Which set is larger?
    A) $\mathbf{N}$      B) $\mathbf{Z}$      C) They are the same size      D) The question doesn't make sense

**Problem 4.** Which set is larger?
    A) $\mathbf{N}$      B) $\mathbf{N} \times \mathbf{N}$      C) They are the same size      D) The question doesn't make sense

**Problem 5.** Let $A$ be a set and recall that $2^A$ is the set of all subsets of $A$. Suppose $f : A \to 2^A$ is a function. Which of the following are possible?

   A) $f$ is injective

   B) $f$ is surjective

   C) Both of the above ($f$ is bijective)

   D) None of the above

**Problem 6.** Which set is larger?
    A) $\mathbf{N}$      B) $\mathbf{R}$      C) They are the same size      D) The question doesn't make sense

**Problem 7.** Let $S$ be the set of equivalence classes of integers modulo 7 and let

$$f : S \to S$$

be the function $f([n]) = [n + 3]$. Is this function a permutation?
    A) Yes      B) No

**Problem 8.** Every permutation of a finite set can be written as a composition of transpositions.
    A) Yes      B) No

**Problem 9.** Let $A$ and $B$ be finite sets. How many *bijections* are there from $A$ to $B$?
    A) $|B|^{|A|}$      B) $|A|^{|B|}$      C) $|A|!$      D) $|B|!$      E) None of these

**Problem 10.** Which of the following are true?

   A) The composition of two injections is an injection.

   B) The composition of two surjections is a surjection.

   C) Both of the above

   D) None of the above