A. In a certain programming language, variable names must follow these rules:

- Only upper-case letters, lower-case letters, digits, and the underscore _ may be used.
- The first character in the variable name may not be a digit.
- Variable names cannot exceed 32 characters.

How many variable names are there in this language?

Let A and B be finite sets. Problems B-D deal with functions $f : A \to B$. (It is implicit in the term "function" that the function must be well-defined.)

B. How many functions $f : A \to B$ are there, in terms of |A| and |B|?

C. How many injective functions $f: A \to B$ are there?

D. How many surjective functions $f : A \to B$ are there?

Problems E-F deal with propositions involving the four propositional variables P, Q, R, and S, together with the logical connectives \land , \lor , \neg , and \Rightarrow . An example is $(P \Rightarrow (S \lor R)) \lor R$.

E. How many such propositions are there? (Warning: This is kind of a trick question.)

F. How many such propositions are there, up to logical equivalence? That is, how many propositions are there, if we consider two propositions to be the same if they are logically equivalent?

Problems G-H deal with four-digit decimal integer numerals with distinct digits. We assume that the first digit is not 0. So 7219 is an example, but 4384 and 0195 are not.

G. How many such numerals are there?

H. What is their sum?