FIFTH GRADED HOMEWORK ASSIGNMENT

Problem 1. Let *f*, *g*, and *h* be functions from a nonempty set *X* to itself. (That is, *X* is the domain and codomain for each function.) Use the Internet or book of your choice to help you construct a proof that composition of these functions is associative. In other words, prove that $f \circ (g \circ h) = (f \circ g) \circ h$. You will need to use proper function notation and include the definition of function composition and function equality.

Problem 2. Look up the definition of functions that are *one-to-one* and functions that are *onto*. Be careful to specify the domain and codomain for your functions.

Problem 3. Prove that the composition of two one-to-one functions is another one-to-one function. Be careful to specify the domain and codomain for your functions. You may use outside sources to help you.

Problem 4. Prove that the composition of two onto functions is another onto function. Be careful to specify the domain and codomain for your functions. You may use outside sources to help you.

Problem 5. Let *X* be any nonempty set. A *permutation* on *X* is any one-to-one, onto function from *X* to itself. Let $\wp_X$ be the set of all permutations on *X* under the combining rule of function composition. Show that $\wp_X$ is a group.