Name (PRINTED): _____

Student ID #: _____

Section # (or TA's: name and time) _____

CMSC 250 Quiz #14 Wednesday, May 5, 2004

Write all answers legibly in the space provided. The number of points possible for each question is indicated in square brackets – the total number of points on the quiz is 30, and you will have exactly 20 minutes to complete this quiz. You may not use calculators, textbooks or any other aids during this quiz.

1. [10 pnts.] Explain how the pigeon hole principle can be used to show that the following is true by giving each of the requested items. Assume you select at random a set of five (not necessarily consecutive) positive integers, can you be sure you have at least two with the same remainder when divided by 4.

   The Domain:

   The Size of the Domain:

   The CoDomain:

   The Size of the CoDomain:

   The Function that Maps this domain to codomain:

2. [5 pnts.] Is it true or false that the cardinality of the set of the positive odd integers is the same as the cardinality of the set of all integers? Remember: To prove two sets have the same cardinality, you must show that there is a bijective function from one to the other (does not have to be formally proven here), or to show that the two sets do not have the same cardinality, you must be able to indicate which is larger and explain why it is larger.

   If it is true, prove it by providing any necessary information. If it is false, explain why.

3. [15 pnts.] Assume the following definitions of functions. Give each of the following in simplest terms. (where f and g are both $R^+ \to R^+$) If the requested action is not possible, simply state IMPOSSIBLE and explain why it is not possible.

   Assume $f(x) = \frac{x^2+3}{4}$ and $g(y) = 4y$

   a. $f \circ g =$

   b. $g \circ f =$

   c. $f^{-1} =$

   d. $g^{-1} =$