Name (PRINTED): _____

Student ID #: _____

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

CMSC 250 Quiz #14 Wednesday, Dec 1, 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. How many elements would you need to select from the set of integers $\{1, 2, 3, 4, 5\}$ to be sure that you know you must have two distinct pairs of numbers that add to the same sum. Note, one pair of numbers must be made of two numbers that are different and by distinct pairs, it means none of the values are in common.
   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.] What do you need to do to prove that set A is countably infinite if you already know that A is infinite and you know you have another set, B, which you already know is countably infinite?

3. [15 pnts.] Assume the following definitions of functions. Give each of the following in simplest terms. (where f and g are both $R^+ \rightarrow R^+$) If the requested action is not possible, simply state IMPOSSIBLE and explain why it is not possible. We are using the book definition that the function and its inverse must both be total functions.

   Assume $f(x) = \frac{x^3+1}{2}$ and $g(y) = \frac{1}{2}y$

   a. $f \circ g =$

   b. $g \circ f =$

   c. $f^{-1} =$

   d. $g^{-1} =$