Name (PRINTED): ______________________

Student ID #: ______________________

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

CMSC 250 Quiz #13 ANSWERS Wed., Apr. 26, 2006

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 15 minutes to complete this quiz. You may not use calculators, textbooks or any other aids during this quiz.

Note: you only need to take the answer as far as a mathematical expression including addition, subtraction, multiplication, division, exponents and factorials.

1. [12 pnts.] For each of the following give a function that meets all of the criteria stated - if something is not specified, you can take either. If it is not possible, write "NOT POSSIBLE".

   a. $f : Z \to Z$, such that f is one-to-one and onto.

   ONE ANSWER: $f(x) = x$

   b. $g : Z \to Q$, such that g is onto.

   ANSWER: NOT POSSIBLE

   c. $h : Z \to Z^{\geq -1}$, such that h is onto.

   ONE ANSWER: $f(x) = (x\text{w}hen x \geq -1) or (|x|\text{w}hen x < -1)$

   d. $i : Z^+ \to Z^-$, such that i is one-to-one.

   ONE ANSWER: $i(x) = -x$

TURN OVER

For the questions on this page - consider the sets:

$$A = \{a, b, c, d, e\}$$

$$B = \{a, b, c\}$$

$$C = \{a, c, e, g\}$$

2. [9 pnts.] For each of the following - state “not a function” if it is not a function at all, “not a total” if it is not a total. Otherwise, if it is a total function you must state either “ONTO” or “NOT ONTO” as appropriate.

   a. $f : A \to B, f = \{(a, a), (b, b), (c, c), (d, a), (e, a)\}$

      ANSWER: ONTO

   b. $g : B \to A, f = \{(a, a), (b, b), (c, c), (d, a), (e, a)\}$

      ANSWER: NOT A FUNCTION

   c. $h : C \to A, h = \{(a, a), (c, b), (e, c), (g, d)\}$

      ANSWER: NOT ONTO

3. [9 pnts.] For each of the following - state “not a function” if it is not a function at all, “not a total” if it is not a total. Otherwise, if it is a total function you must state either “ONE-TO-ONE” or “NOT ONE-TO-ONE” as appropriate.

   a. $f : A \to B, f = \{(a, a), (b, b), (c, c), (d, a), (e, a)\}$

      ANSWER: NOT ONE-TO-ONE

   b. $g : B \to A, f = \{(a, a), (b, b), (c, c), (a, a), (b, b)\}$

      ANSWER: ONE-TO-ONE

   c. $h : C \to A, h = \{(a, a), (c, b), (e, c), (g, d)\}$

      ANSWER: ONE-TO-ONE