

Name (PRINTED): _____

Student ID #: _____

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

CMSC 250

Quiz #13

Wed., April 28, 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 15 minutes to complete this quiz. You may not use calculators, textbooks or any other aids during this quiz.

1. [18 pnts.] Answer each of the following by writing either the word “Yes” or the word “NO” into the blank provided.

Determine if the following functions are one-to-one.

- a. _____ $f : Z \rightarrow Z$ defined as $\forall n \in Z, f(n) = 3n^2 - 1$
- b. _____ $g : R \rightarrow Z$ defined as $\forall n \in R, g(n) = \lceil n + 5 \rceil$
- c. _____ $h : D \rightarrow C$ where $D = \{1, 3, 5, 7\}$ and $C = \{2, 4, 6, 8\}$
defined as $h = \{(1, 2), (3, 4), (5, 2), (7, 8)\}$

Determine if the following functions are onto.

- a. _____ $f : Z \rightarrow Z$ defined as $\forall n \in Z, f(n) = 3n^3 + 2$
- b. _____ $g : R \rightarrow Z$ defined as $\forall n \in R, g(n) = \lceil n - 1 \rceil$
- c. _____ $h : D \rightarrow C$ where $D = \{1, 3, 5, 7\}$ and $C = \{2, 4, 8\}$
defined as $h = \{(1, 2), (3, 4), (5, 8), (7, 8)\}$

2. [12 pnts.] For each of the following prove that it has the property indicated or give a specific counter example to show that it doesn't have the property indicated.

a. Is $f : \mathbb{R} \rightarrow \mathbb{R}$ where $f(x) = -3x^2 + 4$ onto?

b. Is $f : \mathbb{R}^+ \rightarrow \mathbb{R}^+$ where $f(x) = -3x^2 + 4$ one-to-one?