

Kenmerk : TW2015/DWMP/010/ha

Course : **Discrete Mathematics for Computer Science**

Date : September 28, 2015

Time : 08.45–09.45 hrs

**Motivate all your answers. The use of electronic devices is not allowed.
A formula sheet is included.**

In this exam: $\mathbb{N} = \{0, 1, 2, 3, \dots\}$.

1. Let A be an $m \times n$ -matrix with real numbers. Give quantified expressions for the following statements.

(a) [2 pt] A has at least one zero row (a row with entirely zeros).

(b) [4 pt] A has exactly one zero column.

2. [6 pt]

Prove the validity of the following argument using the "Laws of Logic" and the "Rules of Inference".

$$\frac{\begin{array}{l} p \vee (q \wedge \neg r) \\ q \rightarrow (\neg p \wedge r) \\ p \vee r \end{array}}{\therefore p \wedge \neg q}$$

3. [6 pt]

Let A , B and C be sets in a universe U . Prove that:

$$[(A \cap C = B \cap C) \wedge (A \cup C = B \cup C)] \Rightarrow A = B.$$

Total: 18 points