

Kenmerk : TW2015/DWMP/010/ha

Course : **Discrete Mathematics for Technical Computer Science**

Date : October 2, 2017

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 a matrix with  $m$  rows and  $n$  columns.  $a_{ij}$  denotes the real number in the cell in row  $i$  and column  $j$  of  $A$ . Give quantified expressions for the following statements.
  - (a) [2 pt] In each row of  $A$  all numbers are equal.
  - (b) [4 pt] In each column of  $A$  the smallest number is 0 and the largest number is 1.
  
2. [6 pt]  
Prove the validity of the following argument using the "Laws of Logic" and the "Rules of Inference".

$$\frac{p \rightarrow (\neg q \vee r) \quad p \vee r}{\therefore q \rightarrow r}$$

3. [6 pt]  
Let  $A$ ,  $B$  and  $C$  be sets in a universe  $\mathcal{U}$ . Prove the following implication:

$$(A - C = B - C \quad \wedge \quad C - A = C - B) \implies A = B.$$

**Total: 18 points**