HAND IN
Answers recorded
in question paper

QUEEN'S UNIVERSITY
FACULTY OF ARTS AND SCIENCE
SCHOOL OF COMPUTING

CISC-203*
DISCRETE MATHEMATICS FOR COMPUTING SCIENCE

TEST 5
December 2005

Professor Selim G. AKL

Please write your answer to each question only in the box marked **Answer**.
No questions will be answered by the instructor during the exam.
This is a closed-book exam. No computers or calculators are allowed.
If you are unsure of what is wanted for a particular question,
make a reasonable assumption and write this at the beginning of your answer.
PLEASE NOTE: Proctors are unable to respond to queries about the interpretation
of exam questions. Do your best to answer exam questions as written.

NAME: _____

STUDENT NUMBER: _____

FOR INSTRUCTOR'S USE ONLY

Question 1: _____ / 5

Question 2: _____ / 5

Question 3: _____ / 5

Question 4: _____ / 5

TOTAL: _____ / 20

Question 1: [5 marks]

(a) Determine whether the relation represented by the following zero-one matrix is an equivalence relation over the set $\{a, b, c, d\}$. Justify your answer.

$$\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

Answer:

(b) List the ordered pairs in the equivalence relation produced by the following partition of the set $\{a, b, c, d, e, f, g\}$:

$$\{a, b\}, \{c, d\}, \{e, f, g\}$$

Answer:

Question 2: [5 marks]

In the poset $(\{2, 4, 6, 9, 12, 18, 27, 36, 48, 60, 72\}, |)$

Answer:

(i) Identify the maximal elements

(ii) Identify the minimal elements

(iii) Identify the greatest element, if it exists.

(iv) Identify the least element, if it exists.

(v) Identify the upper bounds of $\{2, 9\}$.

(vi) Identify the least upper bound of $\{2, 9\}$, if it exists.

(vii) Identify the lower bounds of $\{60, 72\}$.

(viii) Identify the greatest lower bound of $\{60, 72\}$, if it exists.

Question 3: [5 marks]

Draw all nonisomorphic simple graphs with 4 vertices.

Answer:

Question 4: [5 marks]

(a) Draw a tree-connected network of 15 processors.

Answer:

(b) Describe the fastest way to add the numbers $\{x_1, x_2, \ldots, x_{16}\}$ on the processors of part (a).

Answer: