Curtin University
Department of Computing
Second Quiz – Semester 2, 2014

Subject: **Foundations of Computer Science 200**
Index No.: **12332**

Name:…….

Student ID:……..

Practical Time:…….

Time Allowed: 50 MINUTES, proceeded by a 5-MINUTE READING PERIOD during which time only notes may be made. The supervisor will indicate when answering may commence.

Aids Allowed:

To be supplied by the candidate:- Nil
To be supplied by the University:- Nil

General Instructions:

This test consists of 3 questions worth of 25 marks. Attempt ALL the questions. You may answer the questions in any order.

When answering the questions, use the space allocated for each question. In the unlikely event that you run out of space, use the additional space at the end of the test paper and clearly label your answer.

This test is worth 25% of the total marks for this unit.

Question 1 (4 marks total)

(a) Calculate the Power set **P(S)** for a set **S** in the following cases**.**

- **S=∅**
- **S={a,∅}**

(4 marks)

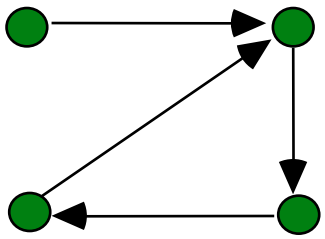
(b) Given two sets A={a, {a}}, B={a, b, {a, b}}. Determine the following.
(2 marks)

A ∩ B

A×B

Question 2 (9 marks total)

(a) Let R a relation defined on a set A={a,b,c,d} and it is given below. (5 marks)



Iteratively compute $\mathbf{R^2}$ and $\mathbf{R^3}$

(b) Give the definition of poset and prove that for any set **S**, **(P(S), ⊆**) is poset.

(4 marks)

Question 3 (12 marks total)

1) Write out the following function in detail (for each variable, give its function value) and Determine whether the following function is one-to-one, onto or both.

F: $P(A) \times P(B) \to P(A \cup B)$

$F((X,Y)) = X \cup Y$ **,**

where *A*={a,c}, *B*={b}

(4 marks)

2) How many one-to-one correspondence functions you can construct from **A** to **B** with the following **A** and **B** ? Justify your solution. (2 marks)

$A = (a_1, a_2, \ldots . a_n)$ and $B = (b_1, b_2, \ldots . . b_n)$

3) (i) Find a recurrence relation for the number of ways to climb n stairs if the person can climb the stairs with two or three stairs at a time.
(ii) What are the initial conditions?
(iii) How many ways can this person climb a flight of 5 stairs?
(6 marks)

End of Test