

SECI1013-06 STRUKTUR DISKRIT

TUTORIAL 1

Lecturer: Assoc. Prof. Dr. Roselina Sallehuudin

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| No. | Name of Students | Student ID |
| 1 | Muhammad Aniq Aqil bin Azrai Fahmi | A20EC0083 |
| 2 | Muhammad Kasyfi bin Kamarul Hamidi | A20EC0093 |
| 3 | Muhammad Naim Bin Abdul Jalil | A20EC0096 |
| 4 | Muhammad Azzam Hamiludin | A20EC5003 |

DISCRETE STRUCTURE (SECI 1013)

TUTORIAL 1

1. Let the universal set be the set R of all real numbers and let A = { R | 0 < ≤ 2 },

B = { R | 1 ≤ < 4} and C = { R | 3 ≤ < 9 }. Find each of the following:

a) A C

B

A

4

3

2

0

b) (A ∪ B)′

B

A

4

2

1

0

c) A′ ∪ B′

B

A

4

2

1

0

2. Draw Venn diagrams to describe sets A, B, and C that satisfy the given conditions.

a) A ∩ B = ∅, A ⊆ C, C ∩ B ≠ ∅

B

A

C

b) A ⊆ B, C ⊆ B, A ∩ C ≠ ∅

C

A

B

c) A ∩ B ≠ ∅, B ∩ C ≠ ∅, A ∩ C = ∅, A ⊄ B, C ⊄ B

B

C

A

3. Given two relations S and T from A to B,

S ∩ T = {(x,y) ∈A×B | (x,y) ∈ S and (x,y) ∈ T}

S ∪ T = {(x,y) ∈A×B | (x,y) ∈ S or (x,y) ∈ T}

Let A={−1, 1, 2, 4} and B={1,2} and defined binary relations S and T from A to B as follows:

For all (x,y) ∈A×B, x S y ↔ |x| = |y|

For all (x,y) ∈A×B, x T y ↔ x− y is even

State explicitly which ordered pairs are in A×B, S, T, S ∩ T, and S ∪ T

4. Show that ¬ ((¬p∧q) ∨ (¬p∧¬q)) ∨ (p∧q) ≡ p. State carefully which of the laws are used at each stage.

Answer:

(De Morgan’s Laws)

(De Morgan’s Laws)

(Double negation Laws)

(Distributive Laws)

(Negation Laws)

(Identity Laws)

#Proven (Absorption Laws)

5. is from to ; is from to ; ordering of

, and : 1, 2, 3, 4, 5.

Find:

a) The matrix of the relation (relative to the given orderings)

1 2 3 4 5

1

2

3

4

5

b) The matrix of the relation (relative to the given orderings)

1 2 3 4 5

1

2

3

4

5

c) Is reflexive, symmetric, transitive, and/or an equivalence relation?

have 1 and 0 on main diagonal and is not reflexive.

, is symmetric.

So, is not transitive.

Thus, R is not equivalence relation because it is a not reflexive, symmetric and not transitive.

d) Is reflexive, antisymmetric, transitive, and/or a partial order relation?

have 0 on its main diagonal. So, is irreflexive

but So, is antisymmetric.

So, is not transitive.

Thus, is not partial order because it is an irreflexive, antisymmetric and not transitive.

6. Suppose that the matrix of relation on {1, 2, 3} is

relative to the ordering 1, 2, 3, and that the matrix of relation on {1, 2, 3} is

relative to the ordering 1, 2, 3. Find:

a) The matrix of relation

b) The matrix of relation

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7. If : **R→ R** and : **R→ R** are both one-to-one, is also one-to-one? Justify your answer.

Answer:

When the function notation : **R→ R** and : **R→ R**, its mean that and are function from the real numbers to the real numbers.So, if is defined as and as , where this are one-to-one function.

However, for all , hence is not one-to-one function. This shows that adding two one-to-one functions does not necessarily produce a function that is one-to-one.

8. With each step you take when climbing a staircase, you can move up either one stair or two stairs. As a result, you can climb the entire staircase taking one stair at a time, taking two at a time, or taking a combination of one- or two-stair increments. For each integer n≥1, if the staircase consists of n stairs, let be the number of different ways to climb the staircase. Find a recurrence relation for .

Answer:

1 way

2 ways

3 ways

,

,

,

9. The Tribonacci sequence (,) is defined by the equations,

for all n≥4.

a) Find .

b) Write a recursive algorithm to compute , n≥1.

Answer:

Input : integer positive

Output :

{ if (

return 1

return

}

# References

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