CSCE 222 [503] Discrete Structures for Computing

Spring 2015 – Philip C. Ritchey

Problem Set 4

Due dates: Electronic submission of the PDF file for this homework is due on **2/19/2015 (Thursday) before 11:59 p.m.** on `http://ecampus.tamu.edu`. A signed and stapled paper copy of the PDF is due on **2/20/2015 (Friday)** at the beginning of class.
You must show your work. **No work → no credit.**

Name: (Han Hong)

Resources. Discrete Mathematics and Its Applications by Rosen, (additional people, books, articles, web pages, etc. that have been consulted when producing this homework)

On my honor, as an Aggie, I have neither given nor received any unauthorized aid on any portion of the academic work included in this assignment. Furthermore, I have disclosed all resources (people, books, web sites, etc.) that have been used to prepare this homework.

Signature: _____

Problem 1. (10 points) Section 9.1, Exercise 4, page 581

Solution.
a) a is taller than b
Reflexive: no (a can't be taller than a)
Symmetric: no (a is taller than b, b cannot be taller than a)
Antisymmetric: yes (No condition to disprove)
Transitive: yes (if a is taller than b and b is taller than c, means a is taller than c)
b) a and b were born on the same day
Reflexive: yes (a = a, b = b)
Symmetric: yes (if a = b, then b must = a)
Antisymmetric: no (a and c can be on the same day)
Transitive: yes (if a = b, and b = c, then a = c)
c) a has same first name as b
Reflexive: yes (a = a, b = b)
Symmetric: yes (if a = b, then b = a)
Antisymmetric: no (a != b, and still belong to the set)
Transitive: yes (if a = b, b = c, then a = c) d) a and b have a common grandparent
Reflexive: yes (a = a, b = b)
Symmetric: yes (if a = b, then b = a) Antisymmetric: no (a != b, and still belong to the set)
Transitive: no (a's grandparent doesn't need to be the same for b and c grandparent)

Problem 2. (10 points) Section 9.1, Exercise 26, page 582

Solution.
a) (a, b) — b ¿ a
b) (a, b) — a ¡= b

Problem 3. (10 points) Section 9.1, Exercise 34, page 582

Solution.
a) R^2 b) R_5
c) R_2 d) R_4
e) ϕ f) R_5
g) R_5 h) R_6

Problem 4. (10 points) Section 9.1, Exercise 36, page 582

Solution.
a) R_1 b) R_1
c) R^2 d) R^2
e) R_1 f) R^2
g) R^2 h) R_3

Problem 5. (10 points) Section 9.2, Exercise 2, page 589

Solution.
(6, 1, 1, 1)
(1, 6, 1, 1)
(1, 1, 6, 1)
(1, 1, 1, 6)
(2, 3, 1, 1)
(3, 2, 1, 1)
(2, 1, 3, 1)
(3, 1, 2, 1)
(2, 1, 1, 3)
(3, 1, 1, 2)
(1, 2, 3, 1)
(1, 3, 2, 1)
(1, 2, 1, 3)
(1, 3, 1, 2)
(1, 1, 2, 3)
(1, 1, 3, 2)

Problem 6. (10 points) Section 9.3, Exercise 32, page 597.
(Definitions of *irreflexive* and *asymmetric* are on pages 581–582)

Solution.
Graph 26
Reflexive: yes
Symmetric: no
Anti-Symmetric: no
Transitive: no
Asymmetric: no

Graph 27
Reflexive: yes
Symmetric: yes
Anti-Symmetric: no
Transitive: yes
Asymmetric: no

Graph 28
Reflexive: yes
Symmetric: yes
Anti-Symmetric: no
Transitive: yes
Asymmetric: no

Problem 7. (10 points) Section 9.5, Exercise 2, page 615

Solution.
Relations a and b are equivalence, with b and c have a same relation with parent.

Problem 8. (10 points) Section 9.5, Exercise 18, page 615

Solution.

Problem 9. (10 points) Section 9.6, Exercise 4, page 630

Solution.
a) no
b) no
c) yes
d) yes

Problem 10. (10 points) Section 9.6, Exercise 16 a) and b), page 630

Solution.
a) (1,1),(1,2),(1,3),(1,4),(2,1),(2,2)
b) (3,2),(3,3),(3,4),(4,1),(4,2),(4,3),(4,4)

Checklist:

( ) Did you add your **name**?

( ) Did you disclose all **resources** that you have used?
(This includes all people, books, websites, etc. that you have consulted)

( ) Did you **sign** that you followed the Aggie honor code?

( ) Did you solve **every problem**?

( ) Did you submit the PDF file of your homework on **eCampus**?

( ) Did you submit a **signed and stapled** hardcopy of the PDF file **in class**?