Viet Tran Quoc Hoang
ID: 01607460
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COMP 3040 : Foundation of Comp. Sci.

HW1

0.1 a) A set of all odd natural numbers.
b) A set of all even integer number.
c) A set of all even numbers.
d) A set of all positive multiples of 6.
e) A set of all binary numbers that are also palindromes.
f) A set of all odd integer numbers.

0.2 a) {1, 10, 100}
b) {n ∈ Z | n > 5}
c) {n ∈ N | n < 5}
d) {abd}
e) {} or ε
d) Ø

0.3 Let A be the set {x,y,z} and B be the set {x,y}.
a) Is A a subset of B? ***No.***
a) Is B a subset of A? ***Yes.***
c) What is A ∪ B? ***{x,y,z}.***
d) What is A ∩ B? ***{x,y}.***
e) What is A × B? ***{(x,x), (x,y), (y,x), (y,y), (z,x), (z,y)}***
f) What is the power set of B? ***P(B) = {Ø, {x}, {y}, {x,y}}.***

0.4 If A has a and B has b elements, how many elements are in $A \times B$? Explain your answer.
For each element in A there will be B ordered pairs, so there will be a × b elements.

0.5 If C is a set with c elements, how many elements are in the power set of C? Explain your answer.
The fomula to determine a power set is $|P(C)| = 2^c$*. Where C is a set and c is a number elements of the set.*

0.6 a) *f(2) = 7*
b) *Domain f = {1, 2, 3, 4, 5} and Range f = {6,7}*
c) *g(2, 10) = 6*
d) *Domain g = {1, 2, 3, 4, 5} and Range g = {6, 7, 8, 9, 10}*
e) *g(4,f(4)) = g(4,7) = 8*

0.7 For each part, give a relation what satisfies the condition.

a) Reflexive and symmetric but not transitive

Let R be a set where $R = \{(a,a),\ (b,b),\ (c,c),\ (a,b),\ (b,a),\ (b,c),\ (c,b)\}$

Reflexive: $(a,a),\ (b,b)$

Symmetric: $(a,b),\ (b,a),\ (b,c),\ (c,b) \in R$

Not transitive because $(a,b),\ (b,c) \in R$ *while* $(a,c) \notin R$

b) Reflexive and transitive but not symmetric

Let R be a set, $R = \{(a,a),\ (b,b),\ (c,c),\ (a,b),\ (b,c),\ (a,c)\}$

Reflexive: $(a,a),\ (b,b),\ (c,c)$

Not symmetric because $(a,b) \in R$ *but* $(b,a) \notin R$

Trasitive: $(a,b),\ (b,c) \in R$ *and* $(a,c) \in R$

c) Symmetric and transitive but not reflexice

Let R be a set, $R = \{(a,b),\ (b,c),\ (a,c),\ (c,a),\ (a,b),\ (b,a)\}$

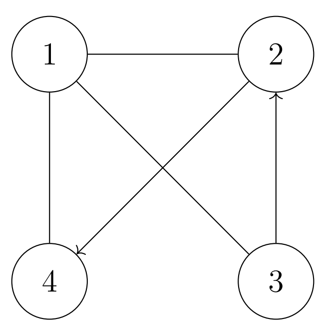
Not reflexive: $(a,a),\ (b,b),\ (c,c) \notin R$

Symmetric: $(a,b),\ (b,a),\ (b,c),\ (c,b),\ (a,c),\ (c,a) \in R$

Trasitive: $(a,b),\ (b,c) \in R$ *also* $(a,c) \in R$

0.8 Consider the undirected graph G = (V,E) where V, the set of nodes, is {1, 2, 3, 4} and E, the set of edges, is {{1, 2}, {2, 3}, {1, 3}, {2, 4}, {1, 4}}. Draw the graph G. What are the degrees of each nodes? Indicate a path from node 3 to node 4 on your drawing of G.

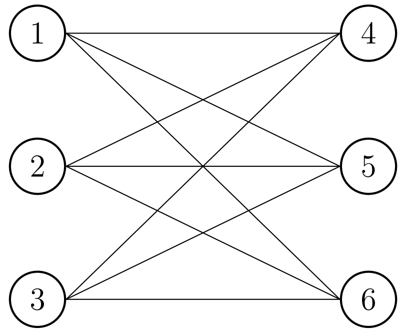
a) Graph G



b) Degrees of node

Node	Degrees
1	3
2	3
3	2
4	2

0.9 Write a formal description of the following graph.



G = (V,E) for any order
G = {{1, 2, 3, 4, 5, 6},{(1, 4), (1, 5), (1, 6), (2, 4), (2, 5), (2, 6), (3, 4), (3, 5), (3,6)}