Michelle Bettencourt COMP.3040 Sept. 19. 2018

Homework 1

0.1.
a. Odd natural numbers
b. Even integers
c. Even natural numbers
d. Natural numbers that are divisible by 2 and 3
e. f. Integers that are one added to that integer

0.2.
a. {1, 10, 100}
b. Z = integers = {...-3, -2, -1, 0, 1, 2, ...}
s = {x : x ϵ Z and x ¿ 5}
c.
d. {aba}
e. ε
f. $\emptyset$

0.3. Let A be the set {x,y,z} and B be the set {x,y}
a. No. Since A contains the element "z" and B does not that means that A can NOT be a subset of B.
b. Yes. Since every element of B is in A, that means B is a subset of A.
c. A $\cup$ B = { x, y, z}
d. A $\cap$ B = {x, y}
e. A $\times$ B = (a, b) where a ϵ A and b ϵ B
= {(x,x), (x,y), (y,x), (y,y), (z,x), (z,y)}
f. {$\emptyset$, {x}, {y}, {x, y}}

0.4.
The amount of elements would be a x b. The elements in a times the elements of b. Because when mutiplying sets you have to take every element from one set and combine it with every element in the second element. For example if A = {x, y, z} and B = {1, 2 , 3, 4} then you have to pair "x" with each element of B. Which would give us the 4 elements {(x,1), (x,2), (y,3), (y,4)} When we repeat this for "y" and "z" you will get 4 + 4 + 4 which could also be written as 3 x 4.

0.5.

The formula to figure out how many elements are in a power set you can use the for-

mula 2^c where c is the number of elements in a set. For example is C = {a, b, c} the P(C) would be{ $\emptyset$, {a}, {b}, {c}, {a, b}, {a, c}, {b, c}, {a, b, c} }

0.6.
a. $f(2) = 7$
b. R = {6,7}
D = {1, 2, 3, 4, 5}
c. $g(2, 10) = 6$
d. R = {6, 7, 8, 9, 10}
D ={(1,6), (1,7), (1,8), (1,9), (1,10), (2,6), (2, 7), (2, 8), (2, 9), (2, 10), (3, 6), (3, 7), (3, 8), (3, 9), (3, 10), (4, 6), (4, 7), (4, 8), (4, 9), (4, 10), (5, 6), (5, 7), (5, 8), (5, 9), (5, 10)}
e. g(4,f(4)) = $g(4, 7) = 8$

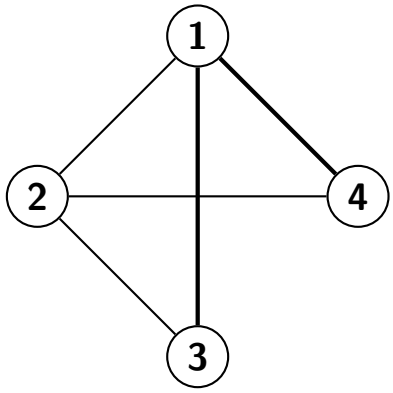
0.7.
Reflexive: for every element a there is a relation (a,a)
Symmetric: if for every relation (a,b) there is an (b,a)
Transitive: for relations (a,b) and (b, c) there should be a (a,c)

a. Reflexive and symmetric but not transitive
R = {(a,a), (b,b), (c,c), (a,b), (b,a), (b,c), (c, b)}
Not transitive because there is (a,b) and (b,c) but no (a,c)
Reflective because there is a (a, a) for every a
Symmetric because for every (b,c) there is a (c,b)

b. Reflexive and transitive but not symmetric
R = {(a,a), (b,b), (c, c) (a,b), (a,c), (a,b), (b,c) (c,b)}
Not symmetric because there is and (a,c) but no (c,a)
Reflective because there is a (a, a) for every a
Transitive because for every (a,b) and (b,a) there is a (a, a)

c. Symmetric and transitive but not reflexive
R = {(a,a), (a,b), (b,a)}
Not reflective because there is no (b,b)
Symmetric because for every (a,b) there is (b,a)
Transitive because for every (a,b) and (b,a) there is a (a, a)

0.8.
G graph:
G graph with highlighted path between 3 and 4: BOLDED



Degrees of each node:
Node 1 : Degree 3
Node 2 : Degree 3
Node 3 : Degree 2
Node 4 : Degree 2

0.9.

G = (V, E) = (Nodes, Edges)
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)}