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CS 215

Homework #3

1. B is a subset of A as it contains two elements of Set A. It is also a proper subset. C is a subset of sets A and D.
   1. { (a,x,0), (a,x,1), (b,x,0), (b,x,1), (c,x,0), (c,x,1), (a,y,0), (a,y,1), (b,y,0), (b,y,1), (c,y,0),(c,y,1)}
   2. { (0,x,a), (0,x,b), (0,x,c), (1,x,a), (1,x,b), (1,x,c), (0,y,a), (0,y,b), (0,y,c), (1,y,a), (1,y,b), (1,y,c)}
2. P({A,B,C}) = { {}, {A}, {B}, {C}, {A,B}, {A,C}, {B,C}, {A,B,C} }
   1. P(x): “x3 >= 1”  
      For any integer “n” less than 0, n3 < 0, thus:  
      {x ϵ **Z** | x >= 1}
   2. Q(x): “x2 = 2”  
      The square root of two is not an integer value, thus:  
      {}
   3. R(x): “x < x2”  
      Any positive integer will be less than it’s square. Likewise, a negative integer times a negative integer will be positive, thus a negative integer squared will be greater than the number, thus:  
      {x ϵ **Z** | x != 0} as 02  is 0
   4. A ᵕ B {a, b, c, d, e, f, g, h}
   5. A ᴖ B {a, b, c, d, e}
   6. A - B { }
   7. B - A {f, g, h}
3. A {1, 5, 7, 8, 3, 6, 9}  
   B {2, 10, 3, 6, 9}
4. Number 24 is on notebook paper.
5. b. Ceiling of 1.1 = 2  
   d. Ceiling of -0.1 = 0  
   f. Ceiling of -2.99 = -1  
   h. Floor of ½ = 0, Ceiling of ½ = 1  
    0 + 1 + ½ = 1.5  
    Ceiling of 1.5 = 2  
   1. Each element of the domain is mapped to only one element of the co domain; therefore it is a one-to-one function.
   2. Elements a and b are both mapped to b, therefore the function is not one-to-one.
   3. Elements a and d are both mapped to d, therefore the function is not one-to-one.
6. a. Any integer applied to this function will yield one less than itself and nothing else.   
    Therefore the function is one-to-one.  
    c. Any integer applied to this function will yield only the cube of itself. Therefore, the  
    function is one-to-one.
7. a. 8 – 1 = 7  
    27  = 128  
    a8 = 128  
   c. (-1)8 = 1  
    1 + 1 = 2  
    a8 = 2
8. 2.4 question #10 is on notebook paper.