CS2305.501

Fall 2015

Homework 3

Alex Lundin

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1. {1,2,4,5,6}
2. {4,5,6}
3. {1,4,5}
4. {1}
5. P
6. P
7. {(1,6),(2,6),(3,6),(4,6),(5,6)}
8. {(ϕ,{ℤ+},{ ℤ-},{ ℤ-, ℤ+}}
9. - ℤ+

( ℤ- U {3,4,5…} ) - ℤ+ By universal discourse and complementation of

ℤ- Subtract all positive integers’ removes the complementation above

{-1,-2,-3…}

1. - ℤ-

( ℤ- U {3,4,5…} ) - ℤ- By universal discourse and complementation of

{3,4,5…} Subtract all negative integers results in only the complementation above



By universal discourse

By intersection

By complementation

1. } ) By universal discourse

) By complementation

By intersection

2

S = {1,2,3,{4}}

A = {1,2,3}

B = { ϕ}

C = {4}

D = {7}

3

For any element in A there exists some ax assume with premise

ax C 🡪 cy definition of subset

For any element in B there exists some bx assume with premise

bx D🡪 dy definition of subset

A x B 🡪(ax,by) definition of cross

C x D 🡪 (cx,dy) definition of cross

Therefore

A x B ⊆ C x D

Alternate proof of 3

Assume A {1,2,3} and C {1,2,3,4}

Such that A ⊆ C

Assume B {6,7,8} and D {6,7,8,9}

So A x B

{(1,6),(1,7),(1,8),(2,6),(2,7),(2,8),(3,6),(3,7),(3,8)}

So C x D

{({(1,6),(1,7),(1,8),(1,9),(2,6),(2,7),(2,8),(2,9),(3,6),(3,7),(3,8),(3,9),(4,6),(4,7),(4,8),(4,9)}

We can see that every element of AxB is an element of C x D

Therefore

A x B ⊆ C x D

4

A{1} B{2}

P(A) = { ϕ,1} P(B) = { ϕ,2}

P(A) U P(B) = { ϕ,1} U { ϕ,2} = { ϕ,1,2}

P(A U B) = P (1,2) = { ϕ,1,2,{1,2}}

Therefore false

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1. Domain: integers, Codomain: integers, Range: ℤ+
2. Domain: real numbers, Codomain: real numbers, Range: real numbers
3. Yes, each separate function of f(x) yields either odd or even respectively

No double mapping therefore one to one.

1. No, the y values are always positive therefore not onto.
2. Yes, no values map twice
3. Yes, all elements in codomain are accounted for
4. Yes, since the original is one to one, the inverse will be as well
   1. f-(y) = x/2 for y >=0

= -(x+1)/2 if y<0

1. Yes, since the original is one to one, the inverse will be as well
   1. g-(y) =
2. Not defined, the range of g is not a subset of the domain of f (definition)
3. Yes

(g o f)(x)

* 1. f-(y) = 8(x^3)+3 if x >=0

= -8(x^3) – 12(x^2) – 6x +3 if x<0

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1. Domain: P{1,2,3…9}, Codomain ℤ+, Range: {1,2,3…10}
2. Domain: ℤ+, Codomain: {{0}.{1},{2}…{9}}, Range: {x mod 10}
3. Yes, no double mapping therefore one to one.
4. No, the y values are always positive therefore not onto.
5. No, some values map twice
6. No, the y values are always positive
7. No, not one to one
8. No note one to one
9. Not defined, the range of g is not a subset of the domain of f (definition)
10. Yes

(g o f)(x)

* 1. ( |x| +1) mod 10