Tutorial 4

Set theory

1.

1. No because 5 (2x) doesn’t divide evenly where half of 5 (x) is an element of integer
2. Yes 10 is an integer and 10 divides 60

2.

1. Yes 2 and 5 are integers
2. No because 3 (2x) doesn’t divide evenly where half of 3 (x) is an element of integer unlike 2 and 6
3. Yes every number that has a integer value when divided by 4 has an integer value when divided by 2 because anything divisible by 4 is divisible by 2

3.

1. Union of {1, 3, 5} and {2, 4, 6} = {1, 3, 5, 2, 4, 6}
2. Intersection of {4, 7, 9} and {9, 7, 3, 6} = common elements between {4, 7, 9} and {9, 7, 3, 6} = {7, 9}
3. Division of {1, 2, 3} and {1, 2, 3, 4, 5} = take {1, 2, 3, 4, 5} out of {1, 2, 3} = {} (empty set)
4. Division of (all integers >= 0) and (all even numbers) = odd numbers above or equal to 0
5. !(x: where x = 2 \* y) where the universe is integers 0 and above (pass)

4.

1. B is not a subset of A, A is subset of B
2. X is a element of B but not A
3. X is an element of the B Portion Excluding A
4. Y is an element of everything except B
5. X is an element of the universe
6. A intersection B = A common with B, because A is subset of B; A intersection B = A. X is element of not A as stated in question B

5.

Skip (stretch)

6.

Skip

Syllogisms

1.

Yes

2.

(same logic in ven diagram for question 3) if x is an element of A and B is a subset of A doesn’t mean x is element of B, for example pug is a subset of dog and kuttu is a name of a dog. Kuttu however is a different subset of dog

3.

(same logic in ven diagram for question 3) if x is an element of B and B is a subset of A then x has to be an element of A, kuttu as we said is a subset of labrodor which is a subset of dog so kuttu therefore has to be a dog

4.

No socretes is element human and mothers are a subset of human, socretes could be a element of another subset of human

Tutorial 5

Proofs

1.

|  |  |  |  |
| --- | --- | --- | --- |
| A | B | (A implies B) | (A implies B) and B |
| T | T | T | T |
| T | F | F | F |
| F | T | T | T |
| F | F | T | F |

((A implies B) and B) doesn’t logically imply A

2.

False

3.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| A | B | C | A and B | A Implies C | (A and B) and (A Implies C) | ((A and B) and (A Implies C)) logically implies C |
| T | T | T | T | T | T | T |
| T | F | F | F | F | F |  |
| F | T | T | F | T | F |  |
| F | F | F | F | T | F |  |

4.

(Stretch later)

Predicate logic

1.

1. Question, Does x = x2 out of the elements {0, 1, 2}? test 1; 0. LHS = 0, RHS = 02 = 0. Test 1 true. test 2; 1. LHS = 1, RHS = 12 = 1. Test 2 true. test 3; 2. LHS = 2, RHS = 22 = 4. Test 3 false. Therefore not true
2. Question, Does x2 = 1 when x is 0 or above out of the elements { −1, 0, 1}? test 1; -1 (part 1, x2 = 1). x2 = (-1) x (-1) = 1. (part 2, x >= 0). -1 is not greater then or equal to 0 so false

2.

1. Quantified
2. Quantified
3. Not quantified, z parameter not defined

3.

1. Test 1: (-1) ˆ 2 = 1, 1 >= 0 = true, -1 <= 0 true. First test true. Test 2: (0) ˆ 2 = 0, 0 >= 0 = true, 0 <= 0 true. Second test true. Test 3: (1) ˆ 2 = 1, 1 >= 0 = true, 1 <= 0 false. Third test false.
2. Test 1: x = -1, y = 1; xy = -1 \* 1 = -1; -1 >= 0 = false. First test false; false statement
3. Cant be bothered to test but this is true
4. Yes if x is 0 anything multiplied will be 0

4.