Name: **Noman Siddique**

Roll Number: P191664

Assignment: **02**

Course: **Formal Method in software Engineering**

Instructor: **Shakir Ullah**

PROBLEM#01

Every crocodile is bigger than every alligator. Sam is a crocodile. But there is a snake, and Sam isn't bigger than that snake. Therefore, something is not an alligator.

• Use C(x), A(x), B(x,y), s, S(x)

Predicate Logic

$(\forall x)\ (\forall y)[C(x) \wedge A(y) \rightarrow B(x,y)] \wedge C(s) \wedge (\exists x)(S(x) \wedge [B(s,x)]') \rightarrow (\exists x)[A(x)]'$

Question:

$P(x): x + y \geq 6$

Possible Solutions:

Let $P(7,1)$ $\quad P(7,1): \ (7)+(1) \geq 6$ $\quad$ True propositional statement

$8 \geq 6$

Let $P(3,2)$ $\quad P(3,2): \ (3)+(2) \geq 6$ $\quad$ False propositional statement

$5 \not\geq 6$

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PROBLEM#03

•Every real number has its corresponding negative.
•Translation: –
Assume:
•a real number is denoted as x and its negative as y
• A predicate P(x,y) denotes: "x + y =0"
• Then we can write: ∀x ∃ y P(x,y)

PROBLEM#04

- For all x and y, if x is a parent of y then y is a child of x
- Assume:
  - Parent(x,y) denotes “x is a parent of y”
  - Child(x,y) denotes “x is a child of y”
- Two equivalent ways to represent the statement:
  - $\forall x \ \forall y$ Parent(x,y) $\Diamond$ Child(y,x)
  - $\forall y \ \forall x$ Parent(x,y) $\Diamond$ Child(y,x)