Introduction to Logic: Worksheet 5
Syntax, Identity and Functions

1. Which of the following are formulae of PLE? For those that are not, explain why they are not. For those that are, state whether they are sentences or open sentences.

    (a)   (∃x) Mx
    (b)   Sx ⊃ Sb
    (c)   (∃x)[Fx & (∀y)(Gy ⊃ Hx]
    (d)   (∀y) Ta
    (e)   (∃x)(∀x)(Mx & Nx)
    (f)   (∀x)[(∃y)Fyx ⊃ (∃y)Fxy]

12 marks

2. Symbolize the following sentences.

    UD: People
    Mx: x is a mole
    Cx: x works for C.T.U.
    Rx: x is a terrorist
    Sxy: x shot y
    Txy: x trusts y
    j: Jack

    (a)   There are no more than two moles working for C.T.U.
    (b)   Jack at shot least three terrorists.
    (c)   Jack only trusts one person.

6 marks

3. Symbolize the following sentences, stating the symbolization key where required.

    UD: Positive integers
    f(x):   the square of x
    g(x):   the successor of x
    Px: x is a prime
    a: 1
    b: 2

    (a)   1 is not the successor of 2
    (b)   The successor of 1 is a prime.
    (c)   No square of a prime is a prime.
    (d)   Exactly one positive integer is both prime and the successor of a prime.

    (e)   Ursula is Phoebe's twin.
    (f)   Someone's twin is a musician.
    (g)   Every twin is the twin of their twin.

16 marks