**Week 4**

1. Construct the truth tables for the following algebraic propositions:

* p and q
* p or q
* not p
* not (p or q)
* not (p and q)
* not P and not q
* not p or not q
* p or not p
* p and not p
* p implies q
* p if and only if q

1. Show that

* (p or q) or r = p or (q or r)
* p or (q and r) = (p or q) and (p or r)
* p and (q or r) = (p and q) or (p and r)
* not (p or q) = not p and not q
* not (p and q) = not p or not q)

1. Let p be "It is cold" and let q be "It is raining". Give a simple verbal sentence which describes each of the following statements:

* not p
* p and q
* p or q
* q if and only if p
* p implies that not q
* q or not p
* not p and not q
* p if and only if not q
* not not q
* (p and not q) implies that p

1. Let p be "he is tall" and let q be "He is handsome" Write each of the following statements in symbolic form using p and q.

* He is tall and handsome
* He is tall but not handsome
* It is false that he is short or handsome
* He is neither tall nor handsome
* He is tall, or he is short and handsome
* It is not true that he is short or not handsome

1. The following two algorithms both describe how to behave when approaching traffic signals:

**if** signal is working **then**

**if** signal is red or signal is amber **then** stop

**else** proceed

**endif**

**endif**

**if** signal is working **then**

**if** signal is red or signal is amber **then** stop

**endif**

**else** proceed

**endif**

In what circumstances do the algorithms describe different behaviour? Which algorithm do you consider the more satisfactory?

1. The following algorithm purports to describe how to find a perfect marriage partner:

**repeat**

send £100 to Compute-a-Date

go out with selected person

**until** the perfect partner is found

Under what conditions does this algorithm fail? Amend the algorithm appropriately.

IF funds >= £100 AND there is a prospective partner AND leaveAgency is true THEN

REPEAT

Send £100 to Compute-A-Date

Go out with selected person

UNTIL perfect partner is found OR

funds are < £100 OR

there is NOT a partner go out with OR

leaveAgency is true

END IF

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WHILE funds >= £100 AND

There is a prospective partner AND

Perfect partner is NOT found AND

leaveAgency is false DO

Send £100 to Compute-A-Date

Go out with selected person