CSCI 430: Homework 1

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2.1-1

1. $\neg(p \wedge q) \rightarrow (\top \vee \bot)$
2. $\forall$ x $\in$ X, $\exists$ y$\in$ Y s.t. A(x) $\rightarrow$ B(y)
3. A truth table:

31	41	59	26	41	58
31	41	59	26	41	58
31	41	59	26	41	58
26	31	41	59	41	58
26	31	41	41	59	58
26	31	41	41	58	59

2.1-2

For j=2 to A.length
key = A[j]
i = j-1
while (i¿0) (A[i]¡key)
A[i+1] = A[i]
i = i-1
A[i+1] = key

1 2.1-3

locate = 0
For i=1 to A.length

if(A[i] == v)
locate = i
iflocate == 0)
print "NIL"
else:
print(locate)

Initialization:

Show that 'locate', the variable that will hold the location of 'v' in the array, is 0. A number nonexistent in A[1...n].

Maintenance:

Show that the loop maintains. The body of the loop checks if A[1], A[2], and so on by 1 position to see if the current element is the same as the value of 'v' until A[n]. When an element satisfies the condition if changes 'locate' to the location in the array.

Termination:

Condition of for loop termination is that 'i' ¿ A.length/n. Because each iterator increase by 1, we must have i=(n+1) at that time. Substituting 'i' for (n+1) in the loop we have either 'locate' is 0 or the 'i' were A[i] is equal to 'v' in A[1-n]. Then the if-else statement decides if 'locate' is 0 to print "NIL" or to print the location of v in A[]. Hence the algorithm is correct.

2 2.1-4

Formal:

Input: 2 binary numbers, A and B, represented by A[0...n] and B[0...n] in binary form
Output: Binary number C[0...(N+1)] where C = A+B.

Pseudo:

int carry = 0
for(i=A.length to 0); (-=1)

added = A[i] + B[i] + carry
C[i+1] = added%2
carry = added/2
C[0] = carry