Laboratory 5

*For weeks starting November 8 and November 15. (*Use same lab partner as in Lab 4*)*

The purpose of this lab is to learn how one can re-use the result of previous work. Although the specification does not require it (because implementation decisions are hidden), you are expected to implement this week's assignment using your Lab 4 programs - corrected as described by the TAs. All data must be stored in the data structure provided by last week's work.

Using Laboratory 5 programs implement OVERLAP(A,B) where A and B are integers between 1 and 100. The value to be returned by OVERLAP(A,B) is specified by the following table. In the following table, "a.GA(A,a)" denotes the value assigned to a when GA(A,a) is invoked; this value is undefined if no data is stored for A.

	disjoint	contained ∧ ¬ tangent	¬(disjoint ∨ contained ∨ tangent)	tangent ∧ ¬ contained
GA(A,a)< 0 ∧ GA(B,a)= 1	-1	-1	-1	-1
GA(B,a)< 0 ∧ GA(A,a)= 1	-2	-2	-2	-2
GA(A,a)< 0∧GA(B,a)< 0	-3	-3	-3	-3
(GA(A,a)=1 ∧ GA(B,a)=1) ∧ a.GA(A,a) = a.GA(B,a)	1	2	3	4
(GA(A,a)=1 ∧ GA(B,a)= 1) ∧ a.GA(A,a) < a.GA(B,a)	5	6	7	8
GA(A,a)= 1 ∧ GA(B,a)= 1) ∧ a.GA(A,a) > a.GA(B,a)	9	10	11	12

Definitions:

Since we are working with real numbers, we must define "=" to allow for numerical round-off.

a =b ≡ |a-b| ≤ eps, where eps should be a small positive value (a parameter). Note that this version of equality is reflexive, symmetric, but not transitive.

Def: disjoint ≡ (∀x, (∀y, ¬ (INCIRC(A,x,y) > 0 ∧ INCIRC(B,x,y) > 0)))

Def: contained ≡
(∀x, (∀y, INCIRC(A,x,y) > 0 ⇒ INCIRC(B,x,y) > 0)) ∨
(∀x, (∀y, INCIRC(B,x,y) > 0 ⇒ INCIRC(A,x,y) > 0))

Def: tangent ≡ ¬ (disjoint ∨ contained) ∧
(∀x,(∀y, (INCIRC(A,x,y) > 0 ∧ INCIRC(B,x,y) > 0) ⇒ INCIRC(A,x,y) =2 ∧ INCIRC(B,x,y) =2))

In the first week you are to implement this program using the results of last week's work by you and your partner. In the second week, you are to make sure that everything works with a Lab 4 module that has been supplied by another group.