Software Eng. 2AO4 - Software Design I - 2001
Laboratory 2

For weeks starting September 28 and October 5.

Write the program described by the following table.

Note: In all of these laboratories "integer" denotes full 32 bit Oberon (LONGINT) integers.

Def: A procedure, `overlap`, that takes 8 integer arguments: (x_{A0}, y_{A0}, x_{A1}, y_{A1}, x_{B0}, y_{B0}, x_{B1}, y_{B1}) representing two rectangles, A and B. The first pair of arguments gives the (x,y) (Cartesian) coordinates of the upper left corner of rectangle A. The second pair gives the (x,y) coordinates of lower right corner of rectangle A. The third pair gives the (x,y) coordinates of the upper left corner of rectangle B. The fourth pair gives the (x,y) coordinates of lower right corner of rectangle B. The program must return an integer return value as described by table 1 using the following definitions.

	AinB	BinA	disjoint	overlap	AisB	tangent
$\neg$ Arectangle $\wedge$ Brectangle	-1	-1	-1	-1	-1	-1
$\neg$ Brectangle $\wedge$ Arectangle	-2	-2	-2	-2	-2	-2
$\neg$(Brectangle $\vee$Arectangle)	-3	-3	-3	-3	-3	-3
Arectangle $\wedge$ Brectangle	1	2	3	4	5	6

Table 1: Return value for "`overlap`"

In the following tables "$\exists$" denotes "there exists", "$\forall$" denotes "for all" and "|" denotes "such that".

Def: $\text{insideA}(x,y) \equiv (x_{A0} < x < x_{A1)} \wedge (y_{A0} > y > y_{A1})$

Def: $\text{onedgeA}(x,y) \equiv ((x_{A0} = x \vee x = x_{A1}) \wedge (y_{A0} \geq y \geq y_{A1})) \vee ((y_{A0} = y \vee y = y_{A1}) \wedge (x_{A0} \leq x \leq x_{A1}))$

Def: $\text{insideB}(x,y) \equiv (x_{B0} < x < x_{B1)} \wedge (y_{B0} > y > y_{B1})$

Def: $\text{onedgeB}(x,y) \equiv ((x_{B0} = x \vee x = x_{B1}) \wedge (y_{B0} \geq y \geq y_{B1})) \vee ((y_{B0} = y \vee y = y_{B1}) \wedge (x_{B0} \leq x \leq x_{B1}))$

Def: $\text{Arectangle} \equiv \exists\ (x,y) \mid \text{insideA}(x,y)$

Def: $\text{Brectangle} \equiv \exists\ (x,y) \mid \text{insideB}(x,y)$

Def: $\text{AisB} \equiv \forall(x, y)\ (\text{insideA}(x,y) \Rightarrow \text{insideB}(x,y)) \wedge (\text{insideB}(x,y) \Rightarrow \text{insideA}(x,y))$

Def: $\text{AinB} \equiv \forall(x, y)\ (\text{insideA}(x,y) \Rightarrow \text{insideB}(x,y)) \wedge \neg\ \text{AisB}$

Def: $\text{BinA} \equiv \forall(x, y)\ (\text{insideB}(x,y) \Rightarrow \text{insideA}(x,y)) \wedge \neg\ \text{AisB}$

Def: $\text{overlap} \equiv (\exists\ (x,y) \mid \text{insideA}(x,y) \wedge \text{insideB}(x,y)) \wedge \neg\ \text{AisB} \wedge \neg\ \text{AinB} \wedge \neg\ \text{BinA}$

Def: $\text{tangent} \equiv \neg\text{AisB} \wedge \neg\text{AinB} \wedge \neg\text{BinA} \wedge \neg\ \text{overlap} \wedge (\exists\ (x,y) \mid \text{onedgeA}(x,y) \wedge \text{onedgeB}(x,y))$

Def: $\text{disjoint} \equiv \neg\ \text{tangent} \wedge \neg\ \text{overlap} \wedge \neg\ \text{AisB} \wedge \neg\ \text{AinB} \wedge \neg\ \text{BinA}$