Classwork N°.2
due to 2nd March 2012

1. Combinatory base : **S** and **K**

We have seen that the primitive combinators **S** and **K** can define all other combinators such as **C**, **I**, **B**, etc. Thus, it should be possible to prove it using these two primitive combinators. Show the completeness of the S-K basis by answering to the following question.

Question: Calculate the given combinatorial expressions using the definitions:

$$\mathbf{S}xyz := xz(yz)$$

$$\mathbf{K}xy := x$$

$$\mathbf{I}x := x$$

(1) **S K K** x

(2) **S (K S) K** x y z

(3) **S (K (S I)) K** x y

(4) **S (K (S I)) (S (K K) I)** x y

2. Abstraction algorithm

T[] may be defined as follows:

1'| *T*[*v*] => *v*

2'| *T*[(E1 E2)] => (*T*(E1) *T*(E2))

3'| *T*[λx.E] => (**K** *T*[E])

4'| *T*[λx.x] => **I**

5'| *T*[λx.λy.E] => *T*[λx.*T* [λy.E]]

6'| *T*[λx.(E1 E2)] => (**S** *T*[λx.E1] *T*[λx.E2])

Question: Convert the following lambda terms into a combinator using the *T[]* definition:

(5) λx.λy.(yx)

(6) λx.λy.(xy)