Programming Language Compilation

Suggest how you would represent Lambda-expressions in a form suitable for a simple Lambda-evaluator in which the environment is represented as a linked list of name–value pairs. \[5 \text{ marks}\]

Outline the design of the evaluator, paying particular attention to the treatment of bound variables, abstractions and applications. \[5 \text{ marks}\]

Augment your evaluator to cope with sufficient expression operators, including a built-in version of the $Y$ operator so that when the evaluator is given the abstract syntax tree for

$$Y \ (\lambda f. \lambda n. \ n=0 \to 1, \ n*f(n-1)) \ 5$$

it will yield 120. \[10 \text{ marks}\]