Студент: Моисеенков И.П.
Группа: М8О-208Б-19
Номер по списку: 21

Тема: Знакомство с языком МИКРОЛИСП.
Отображение программ из МИКРОЛИСПа в С++.

Лабораторная работа N2
Распечатка файла golden21.cpp.

```
#include "mlisp.h"

extern double a;
extern double b;
double fun(double x);
double golden__section__search(double a, double b);
double golden__start(double a, double b);
extern double mphi;
double __mip__try(double a, double b, double xa, double
ya, double xb, double yb);
bool close__enough_Q(double x, double y);
extern double tolerance;
extern double total__iterations;
extern double xmin;

double a = 2., b = 6.;

//(define (fun x)
// (set! x (- x (/ 21 22)))
// (-(expt(- x 3) 4) (expt(atan x) 3) 2)
//)

double fun(double x) {
   x = x - 21. / 22.;
   return expt(x - 3., 4.) - expt(atan(x), 3.) - 2.;
}

//(define (golden-section-search a b)
// (let(
//     (xmin(if(< a b)(golden-start a b)(golden-start b a )))
//    )
//    (newline)
```

```
//     xmin
// )
//)

double golden__section__search(double a, double b) {
   {
      double
         xmin((a < b ? golden__start(a, b) : golden__start(b,
a)));
      newline();
      return xmin;
   }
}

//(define (golden-start a b)
// (set! total-iterations 0)
// (let(
//      (xa (+ a (* mphi(- b a))))
//      (xb (+ b (-(* mphi(- b a)))))
//     )
//     (try a b xa (fun xa) xb (fun xb))
// )
//)

double golden__start(double a, double b) {
   total__iterations = 0.;
   {
      double
         xa(a + (mphi * (b - a))),
         xb(b + (-(mphi * (b - a))));
      return __mip__try(a, b, xa, fun(xa), xb, fun(xb));
   }
}

//(define mphi (* (- 3(sqrt 5))(/ 2.0)))
double mphi = (3. - sqrt(5.)) * (1. / 2.0);

//(define (try a b xa ya xb yb)
// (if(close-enough? a b)
//      (* (+ a b)0.5)
//      (let() (display "+")
//           (set! total-iterations (+ total-iterations 1))
```

```
//          (cond((< ya yb)(set! b xb)
//                  (set! xb xa)
//                  (set! yb ya)
//                  (set! xa (+ a (* mphi(- b a))))
//                  (try a b xa (fun xa) xb yb)
//              )
//              (else   (set! a xa)
//                  (set! xa xb)
//                  (set! ya yb)
//                  (set! xb (- b (* mphi(- b a))))
//                  (try a b xa ya xb (fun xb))
//               )
//          );cond...
//     );let...
// );if...
//)

double __mip__try(double a, double b, double xa, double
ya, double xb, double yb) {
   return (close__enough_Q(a, b) ?
      ((a + b) * 0.5) :
      (   display("+"),
         total__iterations = total__iterations + 1,
         (ya < yb ? (b = xb,
               xb = xa,
               yb = ya,
               xa = a + mphi * (b - a),
               __mip__try(a, b, xa, fun(xa), xb, yb)
            ) : (a = xa,
               xa = xb,
               ya = yb,
               xb = b - mphi * (b - a),
               __mip__try(a, b, xa, ya, xb, fun(xb))
            )
         )
      )
   );
}

//(define (close-enough? x y)
//  (<(abs (- x y))tolerance))
```

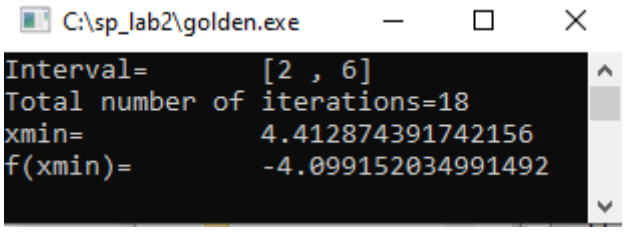
```
bool close__enough_Q(double x, double y) {
   return (abs(x - y) < tolerance);
}

double tolerance = 0.001;
double total__iterations = 0.;
double xmin = 0.;

//(set! xmin(golden-section-search a b))
//  (display"Interval=\t[")
//  (display a)
//  (display" , ")
//  (display b)
//  (display"]\n")
//  (display"Total number of iteranions=")
//total-iterations
//  (display"xmin=\t\t")
//xmin
//  (display"f(xmin)=\t")
//(fun xmin)

int main() {
   xmin = golden__section__search(a, b);
   display("Interval=\t[");
   display(a);
   display(" , ");
   display(b);
   display("]\n");
   display("Total number of iterations=");
   display(total__iterations); newline();
   display("xmin=\t\t");
   display(xmin); newline();
   display("f(xmin)=\t");
   display(fun(xmin)); newline();

   std::cin.get();
   return 0;
}
```

Распечатка файла golden21.ss.

```
;golden21
(define a 2)(define b 6)
(define (fun x)
 (set! x (- x (/ 21 22)))
 (-(expt(- x 3) 4) (expt(atan x) 3) 2)
)
(define (golden-section-search a b)
 (let(
     (xmin(if(< a b)(golden-start a b)(golden-start b a )))
    )
    (newline)
    xmin
 )
)
(define (golden-start a b)
 (set! total-iterations 0)
 (let(
     (xa (+ a (* mphi(- b a))))
     (xb (+ b (-(* mphi(- b a)))))
    )
    (try a b xa (fun xa) xb (fun xb))
 )
)
(define mphi (* (- 3(sqrt 5))(/ 2.0)))
(define (try a b xa ya xb yb)
 (if(close-enough? a b)
     (* (+ a b)0.5)
     (let() (display "+")
          (set! total-iterations (+ total-iterations 1))
          (cond((< ya yb)(set! b xb)
                    (set! xb xa)
                    (set! yb ya)
                    (set! xa (+ a (* mphi(- b a))))
                    (try a b xa (fun xa) xb yb)
               )
               (else    (set! a xa)
                    (set! xa xb)
                    (set! ya yb)
                    (set! xb (- b (* mphi(- b a))))
                    (try a b xa ya xb (fun xb))
```

```
                )
            );cond...
        );let...
 );if...
)
(define (close-enough? x y)
  (<(abs (- x y))tolerance))
(define tolerance 0.001)
(define total-iterations 0)
(define xmin 0)
(set! xmin(golden-section-search a b))
  (display"Interval=\t[")
  (display a)
  (display" , ")
  (display b)
  (display"]\n")
  (display"Total number of iteranions=")
total-iterations
  (display"xmin=\t\t")
xmin
  (display"f(xmin)=\t")
(fun xmin)
```

Скриншот запуска в C++



Скриншот запуска в DrRacket.