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Группа: М8О-208Б-19
Номер по списку: 21

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

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.)) / 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))

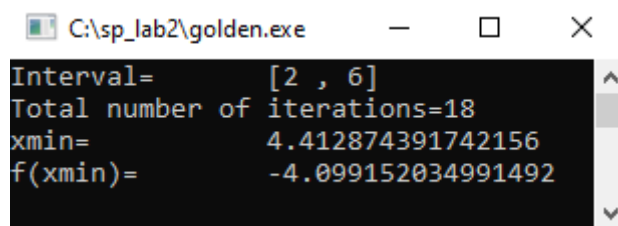
```

```

(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++

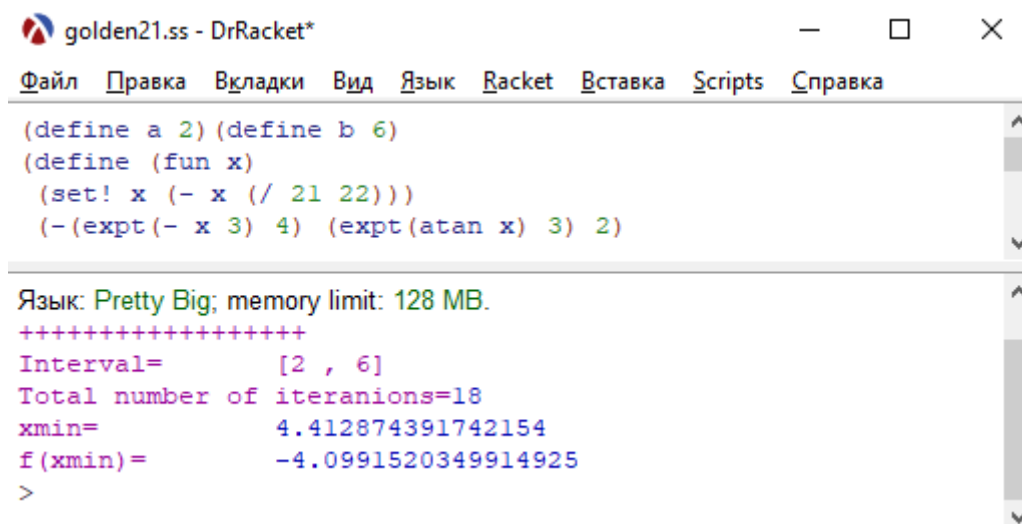


```

C:\sp_lab2\golden.exe
Interval=      [2 , 6]
Total number of iterations=18
xmin=          4.412874391742156
f(xmin)=       -4.099152034991492

```

Скриншот запуска в DrRacket.



```

golden21.ss - DrRacket*
Файл  Правка  Вкладки  Вид  Язык  Racket  Вставка  Scripts  Справка

(define a 2)(define b 6)
(define (fun x)
  (set! x (- x (/ 21 22))))
  (- (expt(- x 3) 4) (expt(atan x) 3) 2)

Язык: Pretty Big; memory limit: 128 MB.
+++++
Interval=      [2 , 6]
Total number of iteranions=18
xmin=          4.412874391742154
f(xmin)=       -4.0991520349914925
>

```