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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.)) * (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.

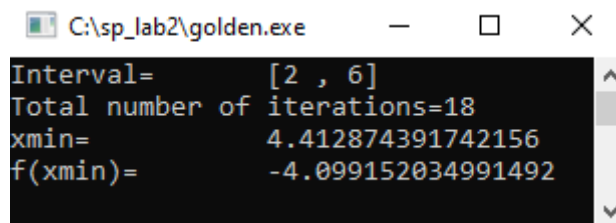
```
;golden21  
(define a 2)(define b 6)  
(define (fun x)  
  (set! x (- x (/ 21 22)))  
  (-(expt(- x 3) 4) (expt(atan x) 3) 2)  
)  
(define (golden-section-search a b)  
  (let(  
    (xmin(if(< a b)(golden-start a b)(golden-start b a )))  
  )  
    (newline)  
    xmin  
  )  
)  
(define (golden-start 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++

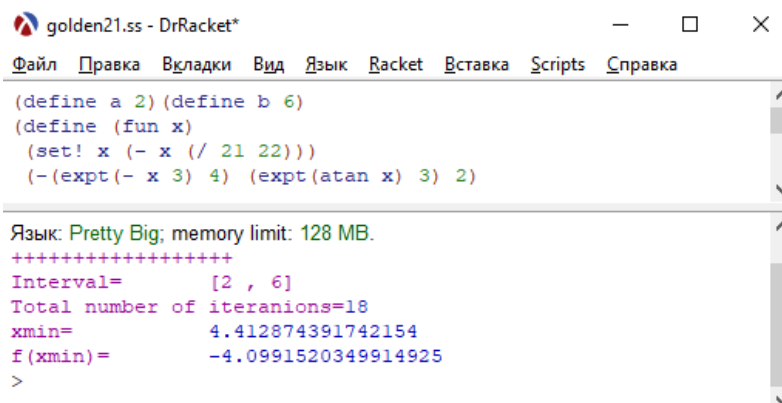


```

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
>

```