Студент: Попов Матвей
Группа: М8О-208Б-20
Номер по списку: 20

«СИСТЕМЫ ПРОГРАММИРОВАНИЯ»
Курсовая работа 2022.
Часть 1.

Вариант грамматики: b20

Контрольная задача №1 – zeller.

Полный скриншот трансляции без трассировки

```
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ g++ Mlispgen.cpp -o Mlispgen
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ ./Mlispgen
Input gramma name>b20
Gramma:b20.txt
Source>zeller
Source:zeller.ss
   1|;zeller.ss for 208
   2|(define (day-of-week)
   3| (zeller dd
   4|       (+ 8(cond((not(and (>= mm 2) (not(= mm 2))))(+ mm 2))(else (- mm 010))))
   5|       (remainder (+ 1(cond((not(>= mm 3))(- yyyy 2))(else (- yyyy 1))))
   6|                   100)
   7|       (quotient (cond((>= 2 mm)(- yyyy 1))(else yyyy))
   8|                 100)
   9| )
  10|)
  11|(define (zeller d m y c)
  12| (neg-to-pos (remainder (+ d y
  13|                           (quotient (-(* 26 m)2) 10)
  14|                           (quotient y 4)
  15|                           (quotient c 4)
  16|                           (* 2(- c))
  17|                        )
  18|            7)
  19| )
  20|)
  21|(define (neg-to-pos d)
  22| (cond((not(>= d 0))(+ d 7))
  23|       (else d)
  24| )
  25|)
  26|(define (birthday dw)
  27|;                  ^{0,...,6}
```

```
(display "Matvey Popov was born on ")
   (display
    (cond
         ((= dw 0)"Sunday ")
         ((= dw 1)"Monday ")
         ((= dw 2)"Tuesday ")
         ((= dw 3)"Wednesday ")
         ((= dw 4)"Thursday ")
         ((= dw 5)"Friday ")
         (else "Saturday ")
    ))
 (display dd)(display ".")
 (display mm)(display ".")
yyyy
)

(define dd 29)
(define mm 11)
(define yyyy 2002)
(birthday (day-of-week))
```

Code:

```
/*  PMR   */
#include "mlisp.h"
double day__of__week/*2*/ ();
        double zeller/*11*/ (double d, double m
        , double y, double c);
        double neg__to__pos/*21*/ (double d);
        double birthday/*26*/ (double dw);
        extern double dd/*44*/;
       extern double mm/*45*/;
       extern double yyyy/*46*/;
       //_______________
double day__of__week/*2*/ (){
 return
 zeller(dd, (8. + (!(((mm >= 2.) && !((mm == 2.))))
       ? (mm + 2.)

       : ((mm - 010.))))
        , remainder((1. + (!((mm >= 3.))
       ? (yyyy - 2.)

       : ((yyyy - 1.)))), 100.), quotient(((2. >= mm)
       ? (yyyy - 1.)

       : (yyyy)), 100.));
       }

double zeller/*11*/ (double d, double m
        , double y, double c){
 return
 neg__to__pos(remainder((d + y + quotient(((26. * m) - 2.), 10.) + quotient(y, 4.) + quotient(c, 4.) + (2. * (- c))), 7.));
       }

double neg__to__pos/*21*/ (double d){
 return
 (!((d >= 0.))
       ? (d + 7.)

       : (d));
       }
```

```
double birthday/*26*/ (double dw){
 display("Matvey Popov was born on ");
         display((((dw == 0.)
        ? "Sunday "
        : (dw == 1.)
        ? "Monday "
        : (dw == 2.)
        ? "Tuesday "
        : (dw == 3.)
        ? "Wednesday "
        : (dw == 4.)
        ? "Thursday "
        : (dw == 5.)
        ? "Friday "
        : ("Saturday "))));
         display(dd);
         display(".");
         display(mm);
         display(".");
         return
 yyyy;
        }

double dd/*44*/ = 29.;

double mm/*45*/ = 11.;

double yyyy/*46*/ = 2002.;
        int main(){
 display(birthday(day__of__week()));
         newline();
          std::cin.get();
         return 0;
         }
```

Скриншот запуска задачи на C++.

```
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ g++ zeller.cpp -o zeller
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ ./zeller
Matvey Popov was born on Friday 29.11.2002

papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$
```

Контрольная задача №2 – half22.

Полный скриншот трансляции без трассировки

```
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ ./Mlispgen
Input gramma name>b20
Gramma:b20.txt
Source>half22
Source:half22.ss
   1|;half22 for 208
   2|(define (root a b)
   3| (define temp 0)
   4|
   5| (set! temp (half-interval a b (f a)(f b)))
   6|  (display"Total number of iteranions=")
   7|  (display total-iterations)(newline)
   8| (display"[")
   9| (display a)
  10| (display" , ")
  11| (display b)
  12| (display"]")
  13|      temp
  14|)
  15|(define (half-interval a b fa fb)
  16| (define root 0)
  17| (set! total-iterations 0)
  18|   (set! root(cond
  19|               ((and(not(>= fa 0))(and (>= fb 0) (not(= fb 0))))      (try a b))
  20|               (else (cond
  21|                         ((and(and (>= fa 0) (not(= fa 0)))(not(>= fb 0)))      (try b a))
  22|                         (else(+ b 1)))
  23|                         )
  24|                    )
  25|               )
  26|               (newline)
  27|     root
  28|    )
  29|
  30|
 31|(define(try neg-point pos-point)
 32| (define midpoint 0)
 33| (define test-value 0)
 34|     (set! midpoint (average neg-point pos-point))
 35|     (cond((close-enough? neg-point pos-point) midpoint)
 36|          (else
 37|
 38|               (let() (set! test-value (f midpoint))
 39|               (display "+")
 40|               (set! total-iterations (+ total-iterations 1))
 41|               (cond((and (>= test-value 0) (not(= test-value 0)))(try neg-point midpoint))
 42|                    (else (cond((not(>= test-value 0))(try midpoint pos-point)) (else midpoint)))
 43|
 44|               ))
 45|          )
 46|     )
 47|)
 48|(define (close-enough? x y)
 49|   (not(>=(abs (- x y))tolerance)))
 50|(define (average x y)(*(+ x y)(/  2e+0)))
 51|
 52|(define tolerance 1e-3)
 53|(define total-iterations 0)
 54|(define(f z)
 55|   (- (expt (cos z) 2) (expt (sin z) 2))
 56|   )
 57| (display"Variant 208-20\n")
 58|;      a b
 59| (root 157e-2 3e+0)
 60| (display"(c) Popov Matvey 2022\n")
 61|
 62|
```

Code:

```
/*  PMR   */
#include "mlisp.h"
double root/*2*/ (double a, double b);
         double half__interval/*15*/ (double a, double b
         , double fa, double fb);
         double __PMR__try/*31*/ (double neg__point, double pos__point);
         bool close__enough_Q/*48*/ (double x, double y);
         double average/*50*/ (double x, double y);
         extern double tolerance/*52*/;
        extern double total__iterations/*53*/;
        double f/*54*/ (double z);
         //________________
double root/*2*/ (double a, double b){
 double temp/*3*/(0.);
        temp = half__interval(a, b
         , f(a), f(b));
         display("Total number of iteranions=");
         display(total__iterations);
         newline();
         display("[");
         display(a);
         display(" , ");
         display(b);
         display("]");
         return
 temp;
        }

double half__interval/*15*/ (double a, double b
         , double fa, double fb){
 double root/*16*/(0.);
        total__iterations = 0.;
         root = ((!((fa >= 0.)) && ((fb >= 0.) && !((fb == 0.))))
        ? __PMR__try(a, b)

        : (((((fa >= 0.) && !((fa == 0.))) && !((fb >= 0.)))
        ? __PMR__try(b, a)

        : ((b + 1.)))));
         newline();
         return
 root;
        }
```

```
double __PMR__try/*31*/ (double neg__point, double pos__point){
 double midpoint/*32*/(0.);
        double test__value/*33*/(0.);
        midpoint = average(neg__point, pos__point);
         return
 (close__enough_Q(neg__point
         , pos__point)
        ? midpoint

        : ((test__value = f(midpoint)
         , display("+")
         , total__iterations = (total__iterations + 1.)
         , (((test__value >= 0.) && !((test__value == 0.)))
        ? __PMR__try(neg__point, midpoint)

        : ((!((test__value >= 0.))
        ? __PMR__try(midpoint, pos__point)

        : (midpoint)))))));
        }

bool close__enough_Q/*48*/ (double x, double y){
 return !((abs((x - y)) >= tolerance));
         }

double average/*50*/ (double x, double y){
 return
 ((x + y) * (1. / 2e+0));
        }

double tolerance/*52*/ = 1e-3;

double total__iterations/*53*/ = 0.;

double f/*54*/ (double z){
 return
 (expt(cos(z), 2.) - expt(sin(z), 2.));
        }
int main(){
 display("Variant 208-20\n");
         display(root(157e-2, 3e+0));
         newline();
         display("(c) Popov Matvey 2022\n");
          std::cin.get();
         return 0;
         }
```

Скриншот запуска задачи на C++.

```
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ g++ half22.cpp -o half22
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ ./half22
Variant 208-20
++++++++++
Total number of iteranions=11
[1.57 , 3]2.35587158203125
(c) Popov Matvey 2022

papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$
```

Контрольная задача №3 – coin22.

Полный скриншот трансляции без трассировки

```
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ ./Mlispgen
Input gramma name>b20
Gramma:b20.txt
Source>coin22
Source:coin22.ss
   1|; coin22.ss
   2|
   3|(define VARIANT 20)
   4|(define COINS 3)
   5|(define (largest coins-set)
   6|    (cond
   7|        ((= coins-set 1) 1)
   8|        (else (cond
   9|               ((= coins-set 2) 2)
  10|               (else (cond
  11|                       ((= coins-set 3) 3)
  12|                       (else 0)
  13|                     )
  14|               )
  15|           )
  16|        )
  17|    )
  18|)
  19|(define (count-change amount)
  20|    (display "_____\n amount: ")
  21|    (display amount)
  22|    (newline)
  23|    (display "COINS: ")
  24|    (display COINS)
  25|    (newline)
  26|    (cond(
  27|           (not(and (and (not(not(and (>= amount 0) (not(= amount 0))))) (not(not(>= COINS 1)))) (not(= (largest COINS) 0))))
  28|           ( let() (display "Improper parameter value!\ncount-change= ") -1)
  29|        )
  30|           (else ( let() (display "List of coin denominations: ")
  31|                  (denomination-list COINS)
  32|                  (display "count-change= ")
  33|                  (cc amount COINS)
  34|              )
  35|             )
  36|    )
  37|)
  38|
  39|(define (Shaeffer? x? y?)
  40|    (not(and (not(not x?)) (not(not y?))))
  41|)
  42|
  43|(define (cc amount coins-set)
  44|    (cond
  45|        ((= amount 0) 1)
  46|        (else (cond((Shaeffer? (>= amount 1) (and (>= coins-set 0) (not(= coins-set 0)))) 0)
  47|                (else (+ (cc amount (- coins-set 1)) (cc (- amount (largest coins-set)) coins-set)))
  48|            )
  49|        )
  50|    )
  51|)
  52|(define (denomination-list coins-set)
  53|    (cond
  54|        ((= coins-set 0) 0)
  55|        (else  ( let() (display (largest coins-set))
  56|            (display " ")
  57|            (denomination-list (- coins-set 1))
  58|        -1))
  59|    )
  60|)
  61|(display "Variant ")
  62|(display VARIANT)
  63|(newline)
  64|(display (count-change 100)) (newline)
  65|(set! COINS 13)
  66|(display (count-change 100)) (newline)
  67|(display "(C) Popov Matvey 2022\n")
  68|
```

```
_________________
Code:
/*  PMR   */
#include "mlisp.h"
extern double VARIANT/*3*/;
        extern double COINS/*4*/;
        double largest/*5*/ (double coins__set);
         double count__change/*19*/ (double amount);
         bool Shaeffer_Q/*39*/ (double x_Q, double y_Q);
         double cc/*43*/ (double amount, double coins__set);
         double denomination__list/*52*/ (double coins__set);
         //_________________
double VARIANT/*3*/ = 20.;

double COINS/*4*/ = 3.;

double largest/*5*/ (double coins__set){
 return
 ((coins__set == 1.)
        ? 1.

        : (((coins__set == 2.)
        ? 2.

        : (((coins__set == 3.)
        ? 3.

        : (0.))))));
        }

double count__change/*19*/ (double amount){
 display("______\n amount: ");
         display(amount);
         newline();
         display("COINS: ");
         display(COINS);
         newline();
         return
 (!(((!(!(((amount >= 0.) && !((amount == 0.))))) && !(!((COINS >= 1.)))) && !((largest(COINS) == 0.))))
        ? (display("Improper parameter value!\ncount-change= ")
         , -1.)

        : ((display("List of coin denominations: ")
         , denomination__list(COINS)
         , display("count-change= ")
         , cc(amount, COINS))));
        }
```

```
bool Shaeffer_Q/*39*/ (double x_Q, double y_Q){
 return !((!(!(x_Q)) && !(!(y_Q))));
        }

double cc/*43*/ (double amount, double coins__set){
 return
 ((amount == 0.)
       ? 1.

       : ((Shaeffer_Q((amount >= 1.)
        , ((coins__set >= 0.) && !((coins__set == 0.))))
       ? 0.

       : ((cc(amount, (coins__set - 1.)) + cc((amount - largest(coins__set)), coins__set))));
       }

double denomination__list/*52*/ (double coins__set){
 return
 ((coins__set == 0.)
       ? 0.

       : ((display(largest(coins__set))
        , display(" ")
        , denomination__list((coins__set - 1.))
        , -1.)));
       }
int main(){
 display("Variant ");
        display(VARIANT);
        newline();
        display(count__change(100.));
        newline();
        COINS = 13.;
        display(count__change(100.));
        newline();
        display("(C) Popov Matvey 2022\n");
         std::cin.get();
        return 0;
        }
```

Скриншот запуска задачи на C++.

```
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ g++ coin22.cpp -o coin22
papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$ ./coin22
Variant 20

______
 amount: 100
COINS: 3
List of coin denominations: 3 2 1 count-change= 884

______
 amount: 100
COINS: 13
Improper parameter value!
count-change= -1
(C) Popov Matvey 2022

papey@papey08-PC:/mnt/c/Users/evgen/Desktop/206-09-c1/curs1$
```