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program calculation;
uses crt;
var
  i,j:integer;
  oper:array[1..100,1..6] of integer;
  arg:array[1..100] of real;
  ch:char;
procedure analiz;
var
  i,ind_arg,ind_o,ind_res,l,t,l_bound,r_bound:integer;
  g,a,b:string[100];
  c:char;
procedure tek_oper;
begin
  b:="";
  r_bound:=pos(')',a);
  if r_bound=0 then l:=0
  else begin
    l_bound:=r_bound;
    while copy(a,l_bound,1)<>'(' do
      l_bound:=l_bound-1;
      b:=copy(a,l_bound+1,r_bound-l_bound-1);
    end;
  end; {endprocedure}
procedure operation(c:char);
var
  l_arg,r_arg,i,code,rt,lt:integer;
  s:char;
  d:string[3];
  z:string[10];
begin
  ind_o:=ind_o+1;
  if copy(b,t-1,1)='x' then begin
    lt:=t-2;
    oper[ind_o,2]:=1;
  end
  else if copy(b,t-1,1)=']' then
    begin
      lt:=t-2;z:="";
      while b[lt]<>'[' do
        begin
          z:=z+b[lt];
          lt:=lt-1;
        end;
      val(z,l_arg,code);
      oper[ind_o,2]:=3;
      oper[ind_o,3]:=l_arg;
      lt:=lt-1;
    end
  else begin
    lt:=t-1;z:="";
    while (b[lt]>='0')and(b[lt]<='9')and(lt>=1) do

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begin
  z:=b[lt]+z;
  lt:=lt-1;
end;
val(z,l_arg,code);
oper[ind_o,2]:=2;
ind_arg:=ind_arg+1;
arg[ind_arg]:=l_arg;
oper[ind_o,3]:=ind_arg;
end;
if copy(b,t+1,1)='x' then begin
  rt:=t+2;
  oper[ind_o,4]:=1;
end
else if copy(b,t+1,1)='[' then
  begin
    rt:=t+2;z:="";
    while b[rt]<>']' do
      begin
        z:=z+b[rt];
        rt:=rt+1;
      end;
    val(z,r_arg,code);
    oper[ind_o,4]:=3;
    oper[ind_o,5]:=r_arg;rt:=rt+1;
  end
else begin
  rt:=t+1;z:="";
  while (b[rt]>='0')and(b[rt]<='9')and(rt<=length(b)) do
    begin
      z:=z+b[rt];
      rt:=rt+1;
    end;
    val(z,r_arg,code);
    oper[ind_o,4]:=2;
    ind_arg:=ind_arg+1;
    arg[ind_arg]:=r_arg;
    oper[ind_o,5]:=ind_arg;
  end;

case c of
'^' : oper[ind_o,1]:=1;
'*' : oper[ind_o,1]:=2;
'/' : oper[ind_o,1]:=3;
'-' : oper[ind_o,1]:=4;
'+' : oper[ind_o,1]:=5;
end;
if copy(b,t-1,1)=']' then oper[ind_o,6]:=oper[ind_o,3]
  else if copy(b,t+1,1)='[' then oper[ind_o,6]:=oper[ind_o,5]
  else begin
    ind_res:=ind_res+1;
    oper[ind_o,6]:=ind_res;

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        end;
str(oper[ind_o,6],d);
b:=copy(b,1,lt)+'[+d+]'+copy(b,rt,length(b)-rt+1);
end;
procedure work_with_arg;
var
  l,d,code:integer;
  z:string[30];
begin
  if b[1]='[' then
    begin
      i:=2;l:=1;z:="";
      while b[i]<>']' do
        begin
          z:=z+b[i];
          i:=i+1;
        end;
      val(z,d,code);l:=2;
      oper[ind_o,2]:=3;oper[ind_o,3]:=d;
    end
  else if b[1]='x'
    then begin
      l:=2;
      oper[ind_o,2]:=1;
    end
  else begin
    oper[ind_o,2]:=2;
    ind_arg:=ind_arg+1;
    val(b,d,code);oper[ind_o,3]:=ind_arg;
    arg[ind_arg]:=d;
  end;
end;
procedure def_func;
var
  l,code,d,i:integer;
  s:string[3];
begin
  ind_o:=ind_o+1;
  work_with_arg;
  s:=copy(a,l_bound-3,3);
  if s='sin' then oper[ind_o,1]:=6;
  if s='cos' then oper[ind_o,1]:=7;
  if s='tan' then oper[ind_o,1]:=8;
  if s='exp' then oper[ind_o,1]:=9;
  if s='log' then oper[ind_o,1]:=10;
  { § ÌËÖM aΓ §Γ«MB B }
  if l=2 then oper[ind_o,6]:=oper[ind_o,3]
    else begin
      ind_res:=ind_res+1;
      oper[ind_o,6]:=ind_res;
    end;
  str(oper[ind_o,6],s);

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a:=copy(a,1,l_bound-4)+['+s+']+copy(a,r_bound+1,length(a)-r_bound);
end;
procedure balans;
var
  i,k:integer;
begin
  k:=0;
  for i:=1 to length(a) do
  begin
    if a[i]='(' then k:=k+1
      else if a[i]=')' then k:=k-1;
  end;
  while not keypressed do;
  ch:=readkey;
end;
begin
  clrscr;
  ind_arg:=0;ind_res:=0;
  ind_o:=0;l:=1;
  a:=(3^x);
  balans;
  while l=1 do
  begin
    tek_oper;
    if l=1 then
    begin
      for i:=1 to 5 do
      begin
        case i of
          1: c:='^';
          2: c:='*';
          3: c:='/';
          4: c:='-';
          5: c:='+';
        end;
        t:=pos(c,b);
        while t<>0 do
        begin
          operation(c);
          t:=pos(c,b);
        end;
      end;
    end;
    g:=copy(a,l_bound-3,3);
    if (g='sin')or(g='cos')or(g='tan')or(g='log')
      then def_func
    else begin
      str(oper[ind_o,6],g);
      a:=copy(a,1,l_bound-1)+['+g+']+copy(a,r_bound+1,length(a)-r_bound);
    end;
  end;
end;{endwhile}
end;

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procedure calc;
var
  ind_o:integer;
  arg1,arg2,res,x:real;
  result:array[1..100] of real;
function log(arg:real):real;
var
  i,j:integer;
  lg,res,d:real;
begin
  log:=0;
  arg:=(arg-1)/(arg+1);
  for i:=1 to 20 do
  begin
    res:=1;
    for j:=1 to 2*i-1 do
      res:=res*arg;
    d:=2*res/(2*i-1);
    lg:=lg+d;
  end;
  log:=lg;
end;
begin
write('Ввести аргумент ');readln(x);
ind_o:=1;
while oper[ind_o,1]>0 do
  begin
    case oper[ind_o,2] of
      1: arg1:=x;
      2: arg1:=arg[oper[ind_o,3]];
      3: arg1:=result[oper[ind_o,3]]
    end;
    case oper[ind_o,4] of
      1: arg2:=x;
      2: arg2:=arg[oper[ind_o,5]];
      3: arg2:=result[oper[ind_o,5]]
    end;
    case oper[ind_o,1] of
      1: begin
          res:=log(arg1);
          res:=arg2*res;
          res:=exp(res);
        end;
      2: res:=arg1*arg2;
      3: res:=arg1/arg2;
      4: res:=arg1-arg2;
      5: res:=arg1+arg2;
      6: res:=sin(arg1);
      7: res:=cos(arg1);
      8: res:=sin(arg1)/cos(arg1);
      9: res:=exp(arg1);
      10: res:=log(arg1)
    end;
  end;
end;

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    end;
    result[oper[ind_o,6]]:=res;
    ind_o:=ind_o+1;
end;{ endwhile }
while not keypressed do;
ch:=readkey;
end;
begin
for i:=1 to 6 do
for j:=1 to 100 do
oper[j,i]:=0;
for i:=1 to 100 do arg[i]:=0;
i:=1;
while i<>3 do
begin
clrscr;
writeln('Анализ          -1');
writeln('Расчет          -2');
writeln('Конец работы   -3');
readln(i);
case i of
1: analiz;
2: calc;
end;
end;
end.
end.
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