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APL Assignment 2 - Pascal's Program:

Code:

```
program roots;
uses uComplex;

var a,b,c,d,x,y,z1,z2,z3,z4:real;
var total:integer;

BEGIN
    total:=0;
    repeat
        writeln('Enter 0 0 0 to quit');
        writeln('Enter a b c values:');
        Readln(a,b,c);
        writeln('The a b c values are:', a, ' ', b, ' ', c);
        total:=total+1;
        if a=0 then
            begin
                if b=0 then
                    begin
                        if c=0 then break;
                    end
                else writeln('Solution is x:', -c/b)
                end
            else
                begin
                    d:=b*b-4*a*c;

                    if d>0 then
                        begin
                            x:=(-b+(sqrt(d)))/(2*a);
                            y:=(-b-(sqrt(d)))/(2*a);
                            writeln('Roots are real...');
                            writeln('Root 1:', x);
                            writeln('Root 2:', y);
                        end
                    else
```

```

begin
  if d=0 then
    begin
      writeln('One real root...');
      writeln('Root 1:', -b/(2*a));
    end
  else
    begin
      z1:=(-b)/(2*a);
      z2:=sqrt(-d)/(2*a);
      z3:= z1+z2;
      z4:= z1-z2;
      writeln('Roots are imaginary...');
      writeln('Root 1:','i*',z3);
      writeln('Root 2:','i*',z4);
    end;
  end;
end;
until a+b+c=0;
writeln(total-1, ' equations were solved');
readln;

```

END.

Output:

1. Compiled Successfully

The screenshot shows the Free Pascal IDE with a Pascal program in the editor and a compilation window open. The program is a loop that solves quadratic equations until the sum of coefficients a+b+c equals zero. The compilation window displays the following information:

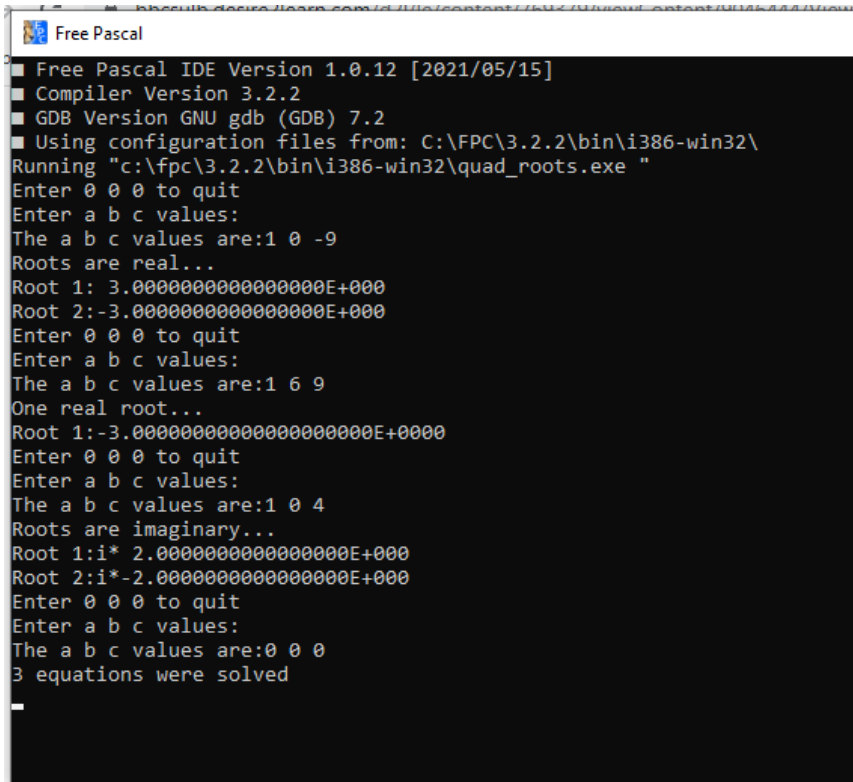
```

Main file: C:\...\i386-win32\quad_roots.pas
Done.
Target: Win32 for i386
Line number: 59      Total lines: 58
Used memory: 5834K   Allocated memory: 25952K
Total errors: 0      Compile time: 0.0s
Compile successful: Press any key

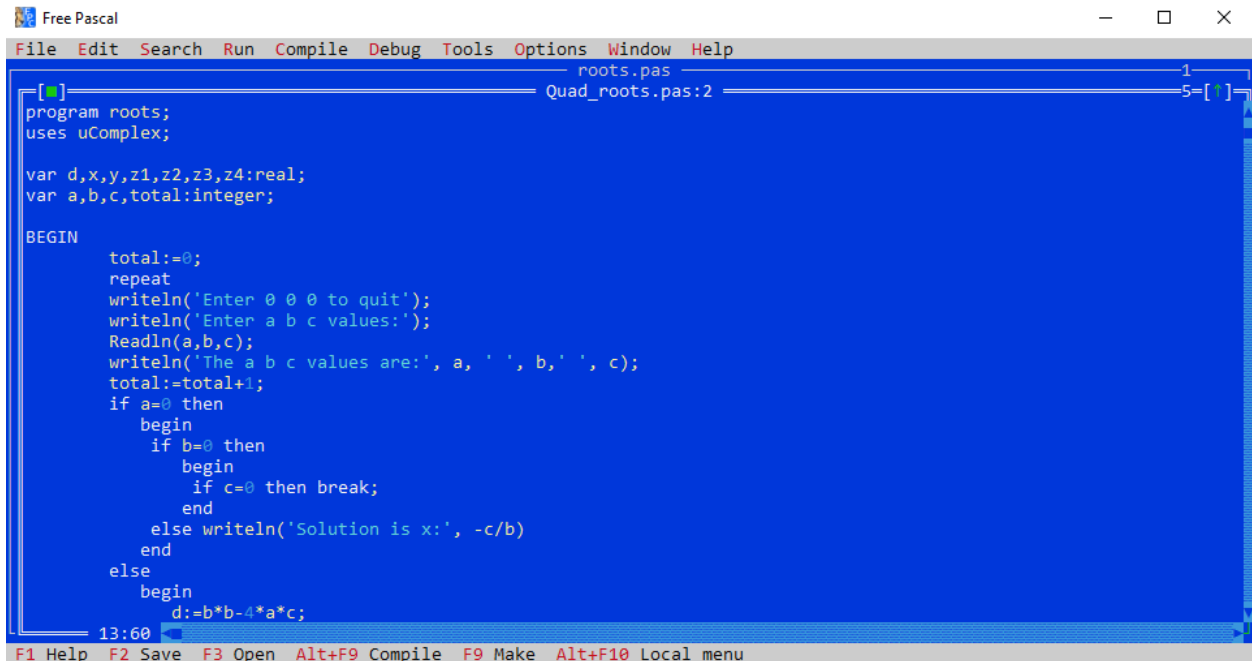
```

The IDE interface includes a menu bar (File, Edit, Search, Run, Compile, Debug, Tools, Options, Window, Help) and a status bar at the bottom with keyboard shortcuts (F1 Help, F3 Open, Alt+F9 Compile, F9 Make, Alt+F10 Local menu).

2. Run Successfully



```
Free Pascal IDE Version 1.0.12 [2021/05/15]
Compiler Version 3.2.2
GDB Version GNU gdb (GDB) 7.2
Using configuration files from: C:\FPC\3.2.2\bin\i386-win32\
Running "c:\fpc\3.2.2\bin\i386-win32\quad_roots.exe "
Enter 0 0 0 to quit
Enter a b c values:
The a b c values are:1 0 -9
Roots are real...
Root 1: 3.000000000000000E+000
Root 2:-3.000000000000000E+000
Enter 0 0 0 to quit
Enter a b c values:
The a b c values are:1 6 9
One real root...
Root 1:-3.000000000000000E+000
Enter 0 0 0 to quit
Enter a b c values:
The a b c values are:1 0 4
Roots are imaginary...
Root 1:i* 2.000000000000000E+000
Root 2:i*-2.000000000000000E+000
Enter 0 0 0 to quit
Enter a b c values:
The a b c values are:0 0 0
3 equations were solved
```



```
Free Pascal
File Edit Search Run Compile Debug Tools Options Window Help
roots.pas 1
Quad_roots.pas:2 5=[ ]
[ ]
program roots;
uses uComplex;

var d,x,y,z1,z2,z3,z4:real;
var a,b,c,total:integer;

BEGIN
    total:=0;
    repeat
        writeln('Enter 0 0 0 to quit');
        writeln('Enter a b c values:');
        Readln(a,b,c);
        writeln('The a b c values are:', a, ' ', b, ' ', c);
        total:=total+1;
        if a=0 then
            begin
                if b=0 then
                    begin
                        if c=0 then break;
                    end
                else writeln('Solution is x:', -c/b)
                end
            else
                begin
                    d:=b*b-4*a*c;
                end
            end
    until total=5;
end.
```

The screenshot shows the Free Pascal IDE with a menu bar (File, Edit, Search, Run, Compile, Debug, Tools, Options, Window, Help) and a toolbar. The editor displays the first part of a Pascal program in 'Quad_roots.pas' at line 2. The code calculates the discriminant $d = b^2 - 4ac$ and handles three cases: $d > 0$ (two real roots), $d = 0$ (one real root), and $d < 0$ (two imaginary roots). The status bar at the bottom shows the time as 13:60 and lists keyboard shortcuts: F1 Help, F2 Save, F3 Open, Alt+F9 Compile, F9 Make, and Alt+F10 Local menu.

```
begin
  d:=b*b-4*a*c;

  if d>0 then
  begin
    x:=(-b+(sqrt(d))/(2*a);
    y:=(-b-(sqrt(d))/(2*a);
    writeln('Roots are real...');
    writeln('Root 1:', x);
    writeln('Root 2:', y);
  end
  else
  begin
    if d=0 then
    begin
      writeln('One real root...');
      writeln('Root 1:', -b/(2*a));
    end
    else
    begin
      z1:=(-b)/(2*a);
      z2:=sqrt(-d)/(2*a);
      z3:= z1+z2;
      z4:= z1-z2;
      writeln('Roots are imaginary...');
```

This screenshot shows the continuation of the Pascal program in the Free Pascal IDE. The code continues from the previous block, handling the imaginary root case by printing the roots with an 'i' multiplier. It then enters a loop that repeats until the user enters a non-zero value for 'a+b+c'. The program ends with 'END.'. The status bar at the bottom remains the same, showing the time as 13:60 and the same keyboard shortcuts.

```
      writeln('Roots are imaginary...');
      writeln('Root 1:', 'i*', z3);
      writeln('Root 2:', 'i*', z4);
    end;
  end;
until a+b+c<0;
writeln(total-1, ' equations were solved');
readln;

END.
```