Write a complete C++ program, including at least one <u>good comment at the top</u>, to do the following: Your program will compute values of a formula that expresses y in terms of x. The formula is:

$$y = \frac{-4x^3 - 12x^2 + x + 15}{(2x^2+1)^{1/2} + 7 * |x-2.5|}$$

| | means absolute value; $(...)^{1/2}$ means square root
You should use library functions for square root and absolute value.

1. The program should start by printing a message giving your name and saying this is the output of your first program.

2. Then your program should evaluate the formula shown above, starting with x = -4, going up by 0.5 each time until it reaches 3.0. Therefore, your program will use these values for x: -4, -3.5, ...,-0.5, 0, 0.5, 1, 1.5, 2.0, 2.5, 3.0.

For each x value, the program should compute the corresponding y value. It should print these values together with explanations of what the values represent. For example, it could print the string "X = ", then the value of x, the string "Y = ", the value of y, and a message. (It is also possible to use column headings and have your numbers underneath the headings.)
The message should say one of three things (on the same line as the values):

If the value of y is exactly 0, the message should say Y IS ZERO.
If the value is positive, the message should say Y IS POSITIVE.
If the value is negative, the message should say Y IS NEGATIVE.

A typical line of output would look like this (or the values of x and y can appear underneath column headings):

X = -1 Y = 0   Y IS ZERO (actually, this one will not be zero)   all on one line

3. Once you have finished using x = 3.0, the program should print a message (underneath the last line of output) saying that your first program is complete, then stop.

OPTIONALS: 1. Have your program find which of the y values is closest to 0 (either larger or smaller) without actually being equal to 0. Print the x value that gives this closest y value. Also print how close the y value is to 0.

2. Have your program count how many times the formula is positive, how many times it is negative, and how many times it is zero. Print these three values.

THe purpose of this program is to input the values of x
into an equation and will tell us the y value
and also tell us if y is positive, negitive or zero

Value of X	Value of Y	Property of Y
X=-4	Y = 1.46357	Y is POSITIVE
X=-3.5	Y = 0.765147	Y is POSITIVE
X=-3	Y = 0.279989	Y is POSITIVE
X=-2.5	Y = 0	Y is ZERO
X=-2	Y = -0.0869565	Y is NEGITIVE
X=-1.5	Y = 0	Y is ZERO
X=-1	Y = 0.228728	Y is POSITIVE
X=-0.5	Y = 0.539939	Y is POSITIVE
X=0	Y = 0.810811	Y is POSITIVE
X=0.5	Y = 0.788191	Y is POSITIVE
X=1	Y = 0	Y is ZERO
X=1.5	Y = -2.56816	Y is NEGITIVE
X=2	Y = -9.69231	Y is NEGITIVE
X=2.5	Y = -32.6599	Y is NEGITIVE
X=3	Y = -25.1944	Y is NEGITIVE

OPTIONAL # 1

X=-2   Y=-0.0869565   Amount to Zero 0.0869565

OPTIONAL # 2

POSITIVES: 7   NEGITIVES: 5   ZERO: 3

END OF PROGRAM 1

```cpp
/*
Marc Pfeiffer
Homework 1
due 2/17/15

This program will solve x and get y and tell us wheather y is
negitive, positive, or zero. the opionals show which values of x brings y closest to zero
without acually hitting zero. opional 2 count how many times the y value is positive
negitive, or zero.
*/
#include <iostream>
#include <cmath>
using namespace std ;
int main()

{

double y, x, Lowest = 10, xval = 10;
int POSITIVE, NEGITIVE, ZERO;
POSITIVE=0;
NEGITIVE=0;
ZERO=0;

cout<< "\tMARC PFEIFFER-HOMEWORK # 1\n\nTHe purpose of this program is to input the
values of x\n";
cout<< "into an equation and will tell us the y value \nand also tell us if y is
positive, negitive or zero" <<endl<<endl;
cout<<"Value of X\t Value of Y\t Property of Y" <<endl<<endl;

for(x=-4;x<=3;x=x+.5)
    {

        y=(-4*(x*x*x)-(12*x*x)+x+15)/(sqrt(2*(x*x)+1)+7*abs(x-2.5));
    cout<<"X="<<x<<"\t\tY = "<<y<<"\t";



    if (y==0){
    cout<<"\tY is ZERO"<<endl;
    ZERO++;
    }

    if (y>0) {
    cout<<"Y is POSITIVE"<<endl;
    POSITIVE++;
    }

    if (y<0){
    cout<<"Y is NEGITIVE"<<endl;
    NEGITIVE++;

    if (abs(y)<Lowest)
    {
    Lowest=y;
    xval=x;  }


    }
    }
cout<<endl<<"\tOPTIONAL # 1 \n" <<endl<<"X="<<xval<<"\t"<<"Y="<<Lowest<<"\tAmount to Zero
"<<abs(Lowest)<<endl<<endl;
cout <<endl<<"\tOPTIONAL # 2\n" <<endl<< "POSITIVES:  "<< POSITIVE <<"\tNEGITIVES:  "<<
NEGITIVE<<"\tZERO:  " <<ZERO<<endl<<endl;
cout<< "\tEND OF PROGRAM 1"<<endl<<endl;
system("pause");
return 0;
}
```