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//Professor Ziegler
//HW2
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import java.io.*;           //needed for File I/O

/*program 2
 * create a table to evaluate a formula y = f(x)
 */
class pgm2{
    public static void main(String[] args) throws IOException{
        double x, y;            //define X and Y for the table
        double xClosest = 0;    //to store value of X when Y is closest to 10
        double yClosest = 0;    //difference between the closest Y and 10
        int firstLoop = 1;      //help assign yClosest = y for the first time
        int zTimes = 0;         //count of y == 0
        int pTimes = 0;         //count of y > 0
        int nTimes = 0;         //count of y < 0
        String status = " ";    //to store status of Y

        //create an output file object using the PrintWriter class
        //PrintWriter OutputFile = new PrintWriter(System.out);
        PrintWriter outputFile = new PrintWriter("c:/myoutput.txt");

        outputFile.println("This is the output of my first program:");
        outputFile.println();
        outputFile.println("\t  Table of Function Values");
        outputFile.println();
        outputFile.println("Value of X\tValue of Y\tStatus of Y");  //headings

        for(x = -3; x <= 4; x += 0.5){
            y = (9 * x * x * x - 27 * x * x - 4 * x + 12) /
                    (Math.sqrt(3 * x * x + 1) + Math.abs(5 - x * x * x * x));

            //use "if statements" to help assign Y status
            if(y == 0){
                status = "Y IS ZERO";
                zTimes++;               //count when y == 0
            }
            if(y > 0){
                status = "Y IS POSITIVE";
                pTimes++;               //count when y > 0
            }
            if(y < 0){
                status = "Y IS NEGATIVE";
                nTimes++;               //count when y < 0
            }

            outputFile.printf("%7.1f%18.5f", x , y);    //print values of X and Y
            outputFile.println("      " + status);      //print Y status

            //assign yClosest = y for the first time
            if(firstLoop == 1){
                yClosest = y;
                firstLoop++;     //going forward firstLoop will be 2, loop will pass this if()
            }
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            //use if() to find the closest Y to 10 and the X that makes it
            if(Math.abs(y - 10) < Math.abs(yClosest - 10)){
                yClosest = y;   //assign to yClosest when y is closer to 10 than the previous y
                xClosest = x;   //assign to xClosest when y is closer to 10 than the previous y
            }
        }

        outputFile.println();
        outputFile.printf("The X value that gives the Y value that is "
                + "closest to 10 is %.1f", xClosest);
        outputFile.println();
        outputFile.printf("and the difference between this Y value and 10 "
                + "is %.5f", Math.abs(yClosest - 10));

        outputFile.println();
        outputFile.println("Times of Y IS ZERO:     " + zTimes);
        outputFile.println("Times of Y IS POSITIVE: " + pTimes);
        outputFile.println("Times of Y IS NEGATIVE: " + nTimes);

        //flush the output buffer
        outputFile.flush();

        //show that the program has completed
        System.out.println("\nThe program is halting...");
        System.out.println("Stop");

        //close the file
        outputFile.close();
    }
}
```