Northeastern Illinois University **Name:________________________**

CS 200: Programming I

Professor Yehuda Gutstein **NEIU-ID:_______________________**

Midterm Exam

SOLUTIONS

Instructions:

1. **Do not turn this page until told to do so.**

2. This exam is ***closed book*** and ***closed notes***.

3. ***Write your name on every page***.

4. There are **five** problems on the exam, one per page. Each problem will be graded as "pass" or "fail".

5. You must place your answer to a question on the **specified** page in the **ANSWER PACKET**. If you place your answer anywhere else, **you will not receive credit for it!**

6. For problems that ask you to write a **method**, you must use the given method header **exactly** as shown, and you do not need to write the main( ) method.

7. You may use "kb", "kbd", "keyboard" or "input" to get input from the keyboard without defining them. Assume the following import statement and keyboard declarations have already been written for you (do not write these statements in your answers):

```
                    import java.util.Scanner;

                    Scanner keyboard = new Scanner (System.in);
        or          Scanner kb = new Scanner (System.in);
        or          Scanner kbd = new Scanner (System.in);
        or          Scanner input = new Scanner (System.in);
```

8. You may use "SOP" as an abbreviation for "System.out.print" and "SOPln" for "System.out.println".

9. You do not need to do any error checking of input values, ***unless the problem specifically asks you to do so!***

10. If you are caught looking at other papers or communicating with other students in any way, you will receive an **F** for this exam.

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Question 1 (20 pts) Tracing.

What is the output of the following Java program?

```
public class TracingQ1{
   public static void main(String[] args){
      int one = 2, two = 0, three = 29327;
      int pail = 7, bucket = 2, waterBottle = 11, tricycle = 3;

      if(three % one <= 1){
         System.out.println("Obi-wan and Chewbacca");
         if(waterBottle % pail >= bucket + tricycle)
            System.out.println("took a millennium falcon");
         else
           System.out.println("went up a hill");
      }
      else if(waterBottle / one <= 1){
         System.out.println("Jack and Jill");
         if(waterBottle % pail <= bucket + tricycle)
            System.out.println("took a millennium falcon");
         else
            System.out.println("went up a hill");
      }
      else
         System.out.println("Mary and Mike");
      if(three < one || one != three){
         if(waterBottle/pail >= bucket + tricycle)
            System.out.println("to fetch a pail of water");
         else
            System.out.println("to get some chocolate milk");
      }
      System.out.println('a');
      if(bucket < 7)
         System.out.println(tricycle + " wheeled Millennium Falcon");
      if(bucket >= 7)
         System.out.println(tricycle);
      System.out.println("ran over them and they did not ");
      if(one + two + three == 6)
         System.out.println("even get hurt.");
      else
         System.out.println("live happily ever after.");
   }
}
```

Output

```
Obi-wan and Chewbacca
went up a hill
to get some chocolate milk
a
3 wheeled Millennium Falcon
ran over them and they did not
live happily ever after.
```

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Question 2 (20 pts) Coding.

- You are working for a sports statistics company. You need to create a program that will calculate the team average for a given statistical category.
- Write the main method for the following program.
- Ask the user the category they would like to enter.
- Then prompt the user to enter decimal (double) values for each player on the team.
- The program will stop prompting for input when the user enters a negative number.
- You must then display the number of values entered, the team average and the team high.
- Sample Output:

```
Category to calculate: Batting Average

Enter scores or a negative number to quit.

Enter Player #1: .333
Enter Player #2: .275
Enter Player #3: .500
Enter Player #4: .095
Enter Player #5: -1

**Team Stats**
Values entered: 4
Team high: .5
Team average: .30075
```

```
Category to calculate: RBI

Enter scores or a negative number to quit.

Enter Player #1: 112
Enter Player #2: 5
Enter Player #3: 37
Enter Player #4: -1

**Team Stats**
Values entered: 3
Team high: 112.0
Team average: 51.3333
```

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```java
public static void main(String[] args){
    Scanner kbd = new Scanner(System.in);
    System.out.print("Category to calculate: ");
    String cat = kbd.nextLine();

    System.out.println();
    System.out.println("Enter scores or a negative number to quit.");
    System.out.println();

    double sum = 0, avg = 0, value = 0, max = 0;
    int count = 0;

    while(value > 0){
        System.out.print("Enter Player #" + (count + 1) + ": ");
        value = kbd.nextDouble();

        if(value > 0){
            sum += value;

            if(value > max)
                max = value;

            count++;
        }
    }

    avg = sum / count;

    System.out.println("**Team Stats**");
    System.out.println("Values entered: " + count);
    System.out.println("Team high: " + max);
    System.out.println("Team average: " + avg);
}
```

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<u>Question 3 (20 pts) Coding.</u>

- You work for a educational game company. You are currently developing a new game to present to your manager. The goal of the new game is for a player to enter as many palindromes as possible.
- Note: A palindrome is a word that is spelled the same both forwards and backwards.
- At this stage of the game’s development, you are required to create the method **public static boolean isPalindrome(String word)**.
- This method will determine if the word being passed in is a palindrome. It will return true if it is, and false if it is not a palindrome.
- The method should work for any word of at least 2 characters in length. If the word is only 1 character in length, then return true.
- Sample Runs:

isPalindrome(“hello”)	returns **false**
isPalindrome(“redivider”)	returns **true**
isPalindrome(“a”)	returns **true**
isPalindrome(“civics”)	returns **false**

```
public static boolean isPalindrome(String word)
{
    boolean palindrome = true;

    for(int i = 0; i < word.length(); i++)
    {
       if(word.charAt(i) != word.charAt(word.length() - i - 1))
          palindrome = false;
    }

    return palindrome;
}
```

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<u>Question 4 (20 pts) Coding.</u>

- Write the method **madeProgress(int num1, int num2, boolean penalty)** that accepts two integer parameters, *start* and *end*, as well as a boolean parameter named *penalty*.
- Given a starting position expressed as an integer value and an ending position also expressed as an integer, the progress that has been made is the difference between them—unless there is a penalty, in which case the progress is reduced by 10.
- The method returns **true** if the progress made is positive or **false** otherwise.
- Sample Runs:

madeProgress(10, 15, false) would return **true**

madeProgress(10, 20, true) would return **false**

madeProgress(100, 95, true) would return **false**

madeProgress(5, 75, false) would return **true**

madeProgress(50, 30, false) would return **false**

```
public static boolean madeProgress(int start, int end, boolean penalty)
{
    int result = end - start;

    if(penalty)
        result -= 10;

    return result > 0;
}
```

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Question 5 (20 pts) Coding.

- As a professor at a prestigious state university, your students will be submitting their midterms projects for your web development class next week. You would like to create a program to simplify the grading process.
- You need to create the method:
  public static char getGrade(boolean validURL, boolean looksLikeSample, boolean brokenImages, int fonts).
- Your method will employ the following grading scale:
  - validURL: true (4 pts), false (0 pts)
  - looksLikeSample: true (2 pts), false (0 pts)
  - brokenImages: true (0 pts), false (2 pts)
  - fonts: 2+ (2 pts), 1 (1 pt), 0 (0 pts)
- Return the following letter grades:
  - A: 9+ pts
  - B: 8 pts
  - C: 7 pts
  - D: 6 pts
  - F: 5 pts or less, or validURL is false
- Sample Runs:

  `getGrade(true, true, true, 1)` would return **‘C’**

  `getGrade(true, true, false, 2)` would return **‘A’**

  `getGrade(false, true, true, 1)` would return **‘F’**

  `getGrade(true, false, true, 0)` would return **‘F’**

  `getGrade(true, true, true, 2)` would return **‘B’**

  `getGrade(true, false, true, 2)` would return **‘D’**

```
public static char getGrade(boolean validURL, boolean looksLikeSample,
                            boolean brokenImages, int fonts)
{
     char grade;
     int score = 0;

     if(validURL)
     {
          score += 4;

          if(looksLikeSample)
               score += 2;

          if(!brokenImages)
               score += 2;

          if(fonts >= 2)
               score += 2;
          else
               score += fonts;
     }

     if(score >= 9)
          grade = 'A';
     else if(score >= 8)
          grade ='B';
     else if(score >= 7)
          grade = 'C';
     else if(score >= 6)
          grade = 'D';
     else
          grade = 'F';

     return grade;
}
```