First Name:	Last Name:
McGill ID:	Section:

Faculty of Science COMP-202A - Foundations of Computing (Practice) - All Sections Midterm Examination

Examiners: Practice

Instructions:

• DO NOT TURN THIS PAGE UNTIL INSTRUCTED

- This is a **closed book** examination; only a letter-sized (8.5" by 11") **crib sheet** is permitted. This crib sheet can be single or double-sided; it can be handwritten or typed. Non-electronic translation dictionaries are permitted, but instructors and invigilators reserve the right to inspect them at any time during the examination.
- Besides the above, only writing implements (pens, pencils, erasers, pencil sharpeners, etc.) are allowed. The possession of any other tools or devices is prohibited.
- Answer **all** questions on the scantron sheet.
- This examination has 13 pages including this cover page, and is printed on both sides of the paper. On page 13, you will find information about useful classes and methods. You may detach page 13 from the examination if you wish.
- MAKE SURE TO WRITE YOUR NAME AND STUDENT ID ON THE SCANTRON AS WELL AS TO FILL IN THE BUBBLE PROPERLY AT THE BEGINNING OF THE EXAM

Scoring

The exam will be scored as follows:

1. This is a practice mid-term examination

Version-0

Regular multiple choice: 2 points each

1. Which of the following is NOT a legal Java statement:

(A) double x = "3"; (B) int x = 3; (C) double x = 7 / 2; (D) double x = 3; (E) double x = 3.0;

2. How many times is the condition of the while loop checked in the following code?

```
int i = 0;
while (i < 10) {
    System.out.println("Repeat!");
    i++;
}
(A) 11
(B) 1
(C) 0
(D) 9
(E) 10
3. What will print in the following code snippet?
```

```
int i = 1;
int j = 2;
i = j;
j = i;
System.out.println(i + " " + j);
(A) 22
(B) 21
(C) 11
(D) 3
(E) 12
```

4. Suppose you have a method with the following header:

public static void fun(double x, int y)

Which of the following are legal ways to call the method:

- I.fun(3, 4.0);
- II.fun(3, 4);
- III.fun(4.0, 3);
- (A) II and III
- (B) I only

- (C) I, II, and III
- (D) III only
- (E) II only

5. Which of the following Java expressions do NOT have a value of 0.

```
(A) ((double)1) / ((int)2)
(B) (int)(((double)1) / 2)
(C) (double)(1 / 2)
(D) 1 / 2
(E) (int)1.0 / 2
```

6. Which of the following Java expressions have a value of 0.

(A) (int)1.0 / 2 (B) "1.0 / 2.0" (C) 1.0 / 2.0 (D) 1 / 2.0 (E) (double) (1 * 2)

Type of Errors

For each of the following answer whether they would cause an compiler error, runtime error, or a bug. In other cases the mentioned error may not cause a problem for the computer and is merely a question of style. In this case you should choose "Style" In other cases the question may not cause a problem at all in which case you should answer "No Error"

For the purpose of this question, you can use the following definitions:

- **Compiler error** : An error that occurs during the compilation phase of your development. In this case no .class file is produced.
- **Runtime error** : An error that occurs while you are running your program. Your program starts to execute but terminates before the main method has finished executing.
- Logical error or bug : An error that results in the wrong results being seen
- Style error : The error does not make a difference to the computer but is something that may be considered bad code.
- 7. Omitting a semi-colon at the end of a variable assignment.
 - (A) Compiler Error
 - (B) Bug (logical) Error
 - (C) Style
 - (D) Runtime Error
 - (E) No Error
- 8. Declaring two variables with the same name in different methods.
 - (A) No Error
 - (B) Compiler Error
 - (C) Style

- (D) Bug (logical) Error
- (E) Runtime Error
- 9. Dividing an int expression by 0.
 - (A) Runtime Error
 - (B) Style
 - (C) No Error
 - (D) Compiler Error
 - (E) Bug (logical) Error
- 10. Omitting the main method from a class and then executing that class.
 - (A) Runtime Error
 - (B) Bug (logical) Error
 - (C) Compiler Error
 - (D) No Error
 - (E) Style
- 11. Storing a double expression into an int.
 - (A) Compiler Error
 - (B) Bug (logical) Error
 - (C) Runtime Error
 - (D) No Error
 - (E) Style
- 12. What prints as a result of the following code being run?

```
public static void main(String[] args) {
      int x = 8;
      int y = 3;
      foo(x, y);
      System.out.println(x + " " + y);
}
public static int foo(int x, int y) {
     x = x * 2;
     int temp = x;
     x = y;
     y = y * 2;
     x = temp;
     return x;
}
(A) 83
(B) 166
(C) 163
(D) 38
(E) 168
```

13. What prints as a result of the following code being run?

```
public static void main(String[] args) {
      int x = 8;
      int y = 3;
      foo(x,y);
      foo(x,y);
}
public static int foo(int y, int x) {
     System.out.print(y + " " + x + " ");
    int temp = x;
    x = y;
     y = x;
     return y;
}
(A) 8383
(B) 3888
(C) 3883
(D) 8338
(E) 3838
```

14. What value is returned by the following method if the input array is $\{2, 3, 4, 1, 2, 1\}$

```
public static int mystery(int[] array) {
    int foo = 1;
    for (int i = 0; i < array.length; i++) {
        foo = foo * array[i];
    }
    return foo;
}
(A) 48
(B) 2
(C) 24
(D) 16
(E) 4</pre>
```

15. What will the following method print when the input number n has value 5

```
public static void mystery(int n) {
    for (int i = -1; i < n; System.out.print(i + " ")) {
        i++;
    }
}
(A) 012345
(B) 01234
(C) -1012345
(D) -101234
(E) The code does not compile.</pre>
```

16. Suppose m and n are both int variables with positive values. Which of the following boolean expressions are guaranteed to be equal in value to the expression that follows?

```
(m % n == 0 && n % m == 0)

• I.m == n

• II. ! (m < n || m > n)

• III. ! (m < n && m > n)
```

- (A) I and III
- (B) I, II, and III
- $(C) \ I \ and \ II$
- (D) None of the expressions are guaranteed to be the same.
- (E) I only
- 17. How many times does the letter A print in the following code?

```
for (int i = -1; i < 3; i++) {
    System.out.println("A")
}
(A) 4
(B) 2
(C) 1
(D) 3
(E) 0</pre>
```

18. How many times does the letter B print in the following code?

```
for (int i = 0; i < 6; i++) {
    for (int j = 0; j <= 5; j++) {
        System.out.println("B");
    }
}
(A) 36
(B) 5
(C) 0
(D) 30
(E) 11</pre>
```

19. How many times does the letter C print in the following code?

```
for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 3; j++) {
        for (int k = 0; k < 2; k++) {
            System.out.println("C");
        }
        System.out.println("C");
}
</pre>
```

(A) 30
(B) 24
(C) 8
(D) 36

(E) 18

20. How many times does the letter D print in the following code?

```
for (int i = 0; i < 3; i++) {
    for (int j = i+1; j < 3; j++) {
        System.out.println("D");
    }
}
(A) 3
(B) 0
(C) 6
(D) 1
(E) 2</pre>
```

21. What prints in the following question.

```
int[][] x = { { 1, 2, 3} , {4, 5}, {6, 7}};
x[0] = new int[4];
System.out.println(x.length);
(A) 3
(B) 8
(C) 7
(D) There is a compiler error.
(E) 2
```

22. What does the following method return when the input array is $\{1, 2, 3\}$?

```
public static int mystery(int[] array) {
    int i = 0;
    int count = 0;
    while (i <= array.length) {
        if (array[i] % 2 == 0) {
            count++;
        }
        i++;
    }
    return count;
}
(A) There is a runtime error.
(B) 3
(C) There is a compiler error.</pre>
```

- (D) 0
- (E) 2

23. What String does the following code return if the input to the method is the String with contents ABCD.

```
public static String mystery(String input) {
    String tricky = "";
    for (int i = 0; i < input.length(); i++) {
        tricky = input.charAt(input.length() - i - 1) + tricky;
    }
    return tricky;
}
(A) ABCD
(B) DDCCBBAA
(C) There is a runtime error.
(D) AABBCCDD
(E) DCBA</pre>
```

24. What String does the following code return if the input to the method is the String with contents ABCDE.

```
public static String mystery(String input) {
    String tricky = "";
    for (int i = 0; i < input.length(); i++) {
        tricky = tricky + input.charAt(i);
        i++;
        tricky = tricky + input.charAt(i);
    }
    return tricky;
}
(A) There is a runtime error.
(B) EDCBA
(C) EEDDCCBBAA</pre>
```

- (D) AABBCCDDEE
- (E) ABCDE

25. What String does the following code return if the input to the method is the String with contents ABCD.

```
public static String mystery(String input) {
   String tricky = "";
   for (int i = 0; i < input.length(); i++) {
      tricky = tricky + input.charAt(i);
      i++;
      tricky = tricky + input.charAt(i-1);
      i--;
   }
   return tricky;
}</pre>
```

- (A) AABBCCDD
- (B) DCBA
- (C) ABCD
- (D) DDCCBBAA
- (E) There is a runtime error.

Longer multiple choice questions (3 points each)

Coding Question - Fibonacci sequence

You are to write a method named "Fibo" that takes as input an integer n, and returns the n^{th} number in the Fibonacci sequence. If Fibo(n) denotes the n^{th} number in the Fibonacci sequence, then recall for n > 2, Fibo(n) = Fibo(n-1) + Fibo(n-2), and Fibo(1) = 1 and Fibo(2) = 1. You are to assume that the user is always going to enter an input greater than 2. For example Fibo(4) = 3.

Use the 7 following questions to "write" your code. Pay close attention to how your answers group together with each other.

```
26. Line 1
```

```
(A) public static int Fibo(int n) {
(B) public static void main(String[] args) {
(C) public static int Fibo() {
(D) public static void Fibo(Double input) {
(E) public static void Fibo(int n) {
```

```
27. Line 2
```

```
(A) int fib1 = 1; int fib2 = 1;
```

(B) None of these statements are useful when paired with other questions, leave blank.

```
(C) int n = 100; n-=0;
(D) n +=1;
```

(E) int[] = new int[n];

```
28. Line 3
```

```
(A) int temp = 0; int counter = 2;
```

- (B) while(fib1< temp) $\{$
- (C) None of these statements are useful when paired with other questions, leave blank.

```
(D) int temp = fib1+fib2;
```

```
(E) int temp, counter;{
```

29. Line 4

```
(A) while(counter<n){
  (B) temp = fib1 + fib2;
  (C) while(true) {
   (D) return Fibo(n-1);
   (E) }</pre>
```

```
30. Line 5
    (A) temp = fib1+fib2; fib1 = fib2; fib2 = temp;
    (B) return temp;
    (C) temp = temp+fib1; fib2=fib1; fib1 = temp;
    (D) counter ++;
    (E) return fib1 + fib2;
```

31. Line 6

- (A) counter++; }
- (B) System.out.print(temp);}
- (C) None of these statements are useful when paired with other questions, leave blank.
- (D) temp++; }

```
(E) fib1 = fib2 + temp; }
```

```
32. Line 7
```

- (A) return temp; }
- (B) return counter;}
- (C) None of these statements are useful when paired with other questions, leave blank.
- (D) return ++temp; }
- $(E) \} \}$

Coding Question - Sorted array

You are to write a method that takes as input an array of integers, returns **true** if the array is sorted, and returns **false** otherwise. For example, if *a* is the array $\{1,12,5,6,2,87\}$, then the method **has** to return **false** as it is not sorted.

Use the 5 following questions to "write" your code. Pay close attention to how your answers group together with each other.

```
33. Line 1
```

```
(B) if (a[i] > a[i-1]) { return true; }
   (C) if (a[i] > a[i+1]) { return true; }
   (D) if (b > a[i+1]) \{ return b; \}
   (E) i++; }
36. Line 4
   (A)
   (B) return false; }
   (C) return true; }
   (D) return b; }
   (E) i++;
37. Line 5
   (A) return true; }
   (B) }
   (C) return false; }
   (D) i++; }
   (E) System.out.print(a); }
```

True false questions (1 point each)

In the following questions answer A for true or B for false.

- 38. In Java, methods can be defined inside of other methods.
 - (A) FALSE
 - (B) TRUE
- 39. In Java, you can change the value of a reference variable declared in the main method in another method.
 - (A) FALSE
 - (B) TRUE
- 40. In Java, all methods must be declared inside of a class.
 - (A) TRUE
 - (B) FALSE
- 41. A variable of type char can be used to store text such as HelloWorld!
 - (A) FALSE
 - (B) TRUE
- 42. The Java compiler can detect infinite loops.
 - (A) FALSE
 - (B) TRUE
- 43. The Java compiler can detect array out of bounds errors.

(A) FALSE

- (B) TRUE
- 44. The Java compiler can detect undeclared variable errors.
 - (A) TRUE
 - (B) FALSE
- 45. What is the value of the following boolean expression?

```
true && (false || !false) && (true || false)
```

- (A) TRUE
- (B) FALSE
- 46. Once an array is created, you can not change its size.
 - (A) TRUE
 - (B) FALSE
- 47. The following code prints 5.
 - System.out.println("" + 3 + 2);
 - (A) TRUE
 - (B) FALSE
- 48. Computer programming is fun all the time! (This question will not be graded)
 - (A) FALSE
 - (B) TRUE
- 49. I wish there were written programming questions on the exam! (This question will not be graded)
 - (A) FALSE
 - (B) TRUE

SUMMARY OF JAVA STANDARD LIBRARY METHODS FOR SELECTED CLASSES

- String (package java.lang) Methods:
 - public boolean equals (Object anObject): Compares this String to anObject.
 - public int length(): Calculates the length of this String.
 - public boolean equalsIgnoreCase(String anotherString): Compares, ignoring case considerations, this String to anotherString.
 - public int compareTo (String anotherString): Compares this String to anotherString lexicographically; returns a negative value if this String occurs before anotherString, a positive value if this String occurs after anotherString, and 0 if both Strings are equal.
 - public int compareToIgnoreCase (String anotherString): Compares, ignoring case considerations, this String to anotherString lexicographically; returns a negative value if this String occurs before anotherString, a positive value if this String occurs after anotherString, and 0 if both Strings are equal.
 - public String substring(int start, int finish): Returns a new String composed of the this String starting from index start and up to, but not including index of finish
 - public String replace(char c, char d): Returns a new String with all occurrences of the character c in the this String replaced by the character d.
 - public char[] toCharArray(): Converts this String to a new character array.
- File (package java.io) Methods:
 - public FileSstring pathname): Creates a new File instance that corresponds to the given pathname.
- Scanner (package java.util) Methods:
 - public Scanner (Inputstream source): Constructs a new Scanner that produces values scanned from the specified input stream.
 - public Scanner (File f): Constructs a new Scanner that produces values scanned from the specified File
 - public double nextDouble(): Scans the next token of the input as a double.
 - public boolean nextBoolean(): Scans the next token of the input as a boolean.
 - public int nextInt(): Scans the next token of the input as an int.
 - public String nextLine(): Advances this Scanner past the current line and returns the input read.
 - public boolean hasNextLine(): Checks whether there are further lines left to scan.
- PrintStream (package java.io) Methods:
 - public void print (boolean b): Prints boolean value b.
 - public void print (double d): Prints double value d.
 - public void print(int i): Prints int value i.
 - public void print (Object o): Prints Object o.
 - public void print(String s): Prints Strings.
 - public void println(): Terminates the current line by writing the line separator string.
 - public void println (boolean b): Prints boolean value b and then terminates the line.
 - public void println (double d): Prints double value d and then terminates the line.
 - public void println(int i): Prints int value i and then terminates the line.
 - public void println(Object o): Prints Object o and then terminates the line.
 - public void println(String s): Prints String s and then terminates the line.
- Math (package java.lang) Methods:
 - public static double pow(double a, double b): Returns the value of a raised to the power of b.
 - public static double sqrt (double a): Returns the correctly rounded positive square root of double value a.
 - public static double random(): Returns a double value with a positive sign, greater than or equal to 0.0 and less than 1.0.
 - public static double exp(double a): Returns Euler's number *e* raised to the power of double value a. (base *e*) of double value a. of double value a.