Name _____

Student Number _____

Instructor: S. Qiao

CS1MD3

Day Class
Duration of examination: 50 minutes
McMaster University Midterm Examination October 2008

This examination paper includes **3** pages and **14** questions. You are responsible for ensuring that your copy of the paper is complete. Bring any discrepancy to the attention of your invigilator.

SPECIAL INSTRUCTIONS: This paper must be returned with your answers. Use of McMaster standard (Casio-FX991) calculator only is allowed.

1. (2 marks) An algorithm must satisfy the three criteria:
   unambiguous, effective, and **finite**.
2. (4 marks) The three important attributes of a variable are name, **type**, and **value**.
3. (4 marks)

```
import acm.program.*;

public class HelloConsole extends ConsoleProgram {

   public void run() {
      println("hello, world");
   }
}
```

   From the above program, `ConsoleProgram` is a subclass of **Program** class;
   `ConsoleProgram` is a superclass of **HelloConsole** class.

4. (2 marks) Suppose that `n` is of type `int`, the type of the value of the expression `19 + n` is
   (a) `int` (b) `double` (c) `boolean` (d) `char`
   Answer: **(a)**
5. (2 marks) Suppose that `n` is of type `int`, the type of the value of the expression `19.0 + n` is
   (a) `int` (b) `double` (c) `boolean` (d) `char`
   Answer: **(b)**
6. (2 marks) The type of the value of the expression `2 < 3` is
   (a) `int` (b) `double` (c) `boolean` (d) `char`
   Answer: **(c)**
7. (2 marks) The value of the expression `5 + 3 / 4` is
   (a) 2 (b) 5 (c) 6 (d) 5.75
   Answer: **(b)**

8. (6 marks) How would you write a Boolean expression to test whether the value of the integer variable `n` was nonnegative?

`(n >= 0)` or `(n > 0) || (n == 0)`

9. (6 marks) Using Java's short-circuit evaluation, write a Boolean expression to test whether the integer variable `m` is divisible by the integer variable `n` when the value of `n` is positive.

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

10. (6 marks) Fill in the truth table for `&&` operator, given Boolean values `p` and `q`:

p	q	p && q
false	false	**false**
false	true	**false**
true	false	**false**
true	true	true

11. (4 marks) What is the output when the program executes the following segment:

```
for (int i = 5; i > 1; i--) {
   println(i);
}
```

Output:

```
5
4
3
2
```

12. (2 marks) Suppose that the value of the integer variable `n` is -3, the output of

```
(n > 0)? println(n) : println(-n);
```

is:

(a) 3 (b) -3 (c) `true` (d) `false`

Answer: **(a)**

13. (6 marks) Complete the following program by filling in the boxes:

```
import acm.program.*;

public class Product extends ConsoleProgram {

   public void run() {
      println("This program multiplies a list of positive integers.");
      println("Enter values, one per line, using " + SENTINEL);
      println("to signal the end of the list.");

      int prod = 1;
      while ( true ) {
         int value =  readInt(" ? ");
         if ( value == SENTINEL ) break;
         prod *= value;
      }
      println("The product is " + prod ".");
   }

   /* constant SENTINEL */
   private static final int SENTINEL = -1;
}
```

14. (6 marks) Modify the following program so that it centers the square in the window and uses a single constant called `SQUARE_SIZE` to define the side of the square. Recall that the method `getWidth()` returns the width of the window and `getHeight()` returns the height of the window.

```
import acm.graphics.*;
import acm.program.*;

public class Square extends GraphicsProgram {

   public void run() {
      int x = 10; [x = (getWidth() - SQUARE_SIZE) / 2;]
      int y = 10; [y = (getHeight() - SQUARE_SIZE) / 2;]
      int size = 100; [delete this]

      GRect sqr = new GRect(x, y, size, size);
      [replace above size by SQUARE_SIZE]
      add(sqr);
   }

/* constant SQUARE_SIZE */
   private static final int SQUARE_SIZE = 100;
}
```