Name _____ Section _____

CS 21a Introduction to Computing I 1st Semester 2006-2007
Midterm Exam

Write your name on each sheet.

I. Multiple Choice. Encircle the letter of the best answer. (20 pts)

1. For the following statement to successfully compile and run:

```
response = reader.readLine();
```

Which of the following statements must be true:

a. `reader` is an object of type `BufferedReader`
b. `response` is an `int`
c. `reader` is an object of type `InputStreamReader`
d. The program imports `java.input.*`

2. Which type of loop executes the loop body at least once?

a. `for`
b. while
c. do-while
d. none of the above

3. Given the following code:

```
int x = 3;
int y = x--;
y += ++x;
```

What are the values of x and y after the code executes?

a. x = 3 and y = 7
b. x = 4 and y = 6
c. x = 3 and y = 7
d. x = 4 and y = 6
e. None of the above

4. `Integer.parseInt()` is a method that performs which operation?

a. Converts an `int` to a `String`
b. Converts a `String` to an `int`
c. Converts a `double` to an `int`
d. None of the above

Name _____ Section _____

5. Consider the code:

```
public static void main ( String args[] )
{
     Test t = new Test();

     if ((t.isWithinRange()) &&
          !(t.capacityExceeded()))
          System.out.println( "Accepted!" );
     else
          System.out.println( "Rejected!" );
}
```

   Which of the following statements is true?

   a. `"Rejected!"` will be printed when `isWithinRange` is `false` or when `capacityExceeded` is `true`
   b. `"Accepted!"` will be printed when `isWithinRange` and `capacityExceeded` are `true`
   c. The code will not compile.
   d. `isWithinRange` and `capacityExceeded` are methods with return type `boolean`.

6. Which of the following is not a method of the String class?

   a. `length`
   b. `substring`
   c. `equals`
   d. `compareTo`
   e. None of the above

7. All of the following statements require a condition explicitly typed with the command, , except the:

   a. `while` statement
   b. `do-while` statement
   c. `if` statement
   d. `switch` statement

8. All of the following identifiers are reserved words in Java, except:

   a. `public`
   b. `int`
   c. `length`
   d. `boolean`
   e. `switch`

Name _____ Section _____

9. Consider the following code fragment:

```
int i;
for( i = 0; i <= 10; i++ )
{
     //empty loop body
}
System.out.println( i );
```

What will be printed out?

a. 10
b. 11
c. 9
d. i
e. empty loop body

10. Consider the following code fragment:

```
public class Book
{
     private Borrower borrower;

     public Book( Borrower borrower )
     {
          this.borrower = borrower;
     }

     public Book()
     {
     }
     .
     .
     .
}
```

Which of the following statements are true?

a. Borrower objects are composed of Book objects
b. A Borrower object must be instantiated before any Book is created
c. Borrower and Book objects are related via *association*
d. Borrower and Book objects are related via *aggregation*
e. All of the above statements are false

Name _____ Section _____

II. Matching Type. Select from the list of answers on the right. Write the letter corresponding to best answer on the space provided. Use capital letters. (10 pts)

_____1. Refers to the visibility of a variable
_____2. Entry point label in a switch statement
_____3. Java statement for iteration best used when the number of iterations is known
_____4. Refers to the name of a method, and the number and types of its parameters
_____5. Instance
_____6. Loop in java where the body is first executed before the test
_____7. Used to initialize objects
_____8. Disposes of objects that have no variables pointing to them
_____9. A Java program
____10. The data stored in an object

A. signature
B. constructor
C. `while`
D. `for`
E. `do-while`
F. object
G. `class`
H. `break`
I. `if`
J. `case` *`literal`*
K. `scope`
L. state
M. behavior
N. garbage collector

III. True or False. Write "True" or "False" on the blanks provided. (10 pts)

_____1. `else` clauses for `if` statements are optional .
_____2. Constructors have a return value of null.
_____3. In Java, whitespaces and indentation do not affect the meaning of a program.
_____4. In Java, a syntax error will occur if a `switch` statement does not contain a `break` statement.
_____5. A main method is unnecessary in BlueJ when developing Java programs since BlueJ can instantiate objects without the `main` method.
_____6. The relationship between two objects is called a composition as long as instances of these objects are connected to each other in some way.
_____7. `readLine` is a method of the class `BufferedReader`.
_____8. The compilation process in Java produces a .java file.
_____9. It is possible for a method to have no arguments.
_____10. A NullPointerException occurs when two variables point to the same object.

Name _____ Section _____

IV. What is printed out? Indicate the output that will result in the space provided (30 pts; 10 points per number)

1. While and if statements

```
int x = 0;
int skipper = 0;

while( x < 50 )
{
    if ( skipper == 10 || skipper == 20 || skipper == 30 )
    {
        System.out.println( "This number is " + x );
    }
    skipper = skipper + 2;
    x++;
}
```

Answer:

2. For-loops (indicate what is printed out assuming x = 5)

```
public void drawShape( int x  )
{
    for( int i = 0; i < x; i ++ )
    {
        System.out.print( "x" );
    }

    System.out.println( "" );

    for( int j = 0; j < x; j++ )
    {
        System.out.println("xx" + " " +  "xx" );
    }

    for( int z = 0; z < x; z++ )
    {

        System.out.print( "x" );
    }
}
```

Answer:

Name _____ Section _____

3. Constructors

```
Constructors c1 = new Constructors( 2, "Davey" );
Constructors c2 = new Constructors( "Jones" );
```

```
public class Constructors
{
   public Constructors( String name )
   {
      int i;

      for ( i = 1; i < 10; i++)
         System.out.println( i + " Hello, " + name );
   }
   public Constructors( int i, String name )
   {
      do
      {
         i--;
         System.out.println( i + " Hi, " + name );
      }
      while ( i >= 0 );
   }
}
```

Answer:

V. The Movie class (10 pts)

In the space provided, answer the following questions about the Movie class shown on the next page :

1. What is the maximum number of tickets that can be sold? _____
2. What is the maximum revenue that can be earned? _____
3. How many tickets will be reserved when `reserveTicket` is called? _____
4. What will happen if `claimTicket` is called three times, passing to it the same valid `confirmationNo`? _____
5. What is the first valid value of `confirmationNo` that reserveTicket will issue? _____
6. What is the maximum number of tickets that a call to `buyTicket` will sell? _____
7. Other than the constructor, which method changes the movie title? _____
8. When would `reserveTicket` return `INVALID`? _____
9. Assume that we declared another class called mall, where mall has five movies. Is mall an aggregate or an association? _____
10. Suppose that a student organization hosted a movie premiere. Each member was tasked to sell 10 tickets to the same movie object. Would the student-to-movie relationship be an aggregate or an association? _____

Name _____ Section _____

```
public class Movie
{
   private String title;
   private int ticketsLeft;
   private int reservedTickets;
   private int confirmationNo;
   private int revenues;
   public static final int MAX_TICKETS = 100;
   public static final int INVALID = 999;

   public Movie( String name )
   {
      title = name;
      ticketsLeft = MAX_TICKETS;
      reservedTickets = 0;
      confirmationNo = 0;
      revenues = 0;
   }
   public int reserveTicket()
   {
      if ( ticketsLeft > 0 ) {
         ticketsLeft--;
         reservedTickets++;
         confirmationNo++;
         revenues += 10;
         return (confirmationNo);
      }
      else
         return INVALID;
   }
   public boolean claimTicket( int reservationNo )
   {
      if (reservationNo <= confirmationNo ) {
         reservedTickets--;
         revenues += 100;
         return true;
      }
      else
         return false;
   }
   public boolean buyTickets(int numTickets )
   {
      if ( ticketsLeft >= numTickets ) {
         ticketsLeft -= numTickets;
         revenues += 100 * numTickets;
         return true;
      }
      else
         return false;
   }
   public void report()
   {
      System.out.println( title );
      System.out.println( "Number of tickets left: " + ticketsLeft );
      System.out.println( "Number of unclaimed: " + reservedTickets);
      System.out.println( "Total revenues: " + revenues );
   }
}
```

Name _____ Section _____

VI. The PiggyBank class (20 points)

Write a class for PiggyBank objects that store 25-cent and 1-peso coins. A template has been provided, to make your coding easier—just fill out the blank areas. You should be able to infer the methods of this class from the template and from the following sample code and its corresponding output.

Output:
The piggy bank now has 15 coins with a total value of 11.25
The piggy bank now has 3 coins with a total value of 0.75

```
PiggyBank p = new PiggyBank();
p.addCoins( 5, 3);
p.addCoins( 0, 7);
System.out.print( "The piggy bank now has " + p.getTotalCoinCount() + " coins" );
System.out.println( " with a total value of " + p.getTotalValue() );
p.emptyOut();
p.addCoins( 3, 0 );
System.out.print( "The piggy bank now has " + p.getTotalCoinCount() + " coins" );
System.out.println( " with a total value of " + p.getTotalValue() );
```

```
public class PiggyBank
{
  // declare your attributes here




   public void addCoins( int num25CentCoins, int num1PesoCoins )
   {




   }

   public void emptyOut()
   {



   }

   public double getTotalValue()
   {



   }

   public int getTotalCoinCount()
   {



   }
}
```