Instructions:

1. This is an open-book test.
2. Please note that the papers are different for CS1101X, CS1101Y and CS1101Z. Check that you get the right paper.
3. The duration of the test is 50 minutes.
4. Calculators are allowed, but not laptops, PDAs or other computing devices.
5. This paper consists of thirteen (13) printed pages, 30 MCQs and one bonus question. Maximum mark is 30.
6. Submit the MCQ answer sheet at the end of the test. You may keep the question paper.

- Write your Matriculation Number as well as shade your Matriculation Number clearly on the MCQ Answer Sheet provided.
- There are 31 Multiple Choice Questions. Each question has one correct answer. Shade your answers clearly on the MCQ Answer Sheet.
- Each correct answer will earn you 1 (one) mark. No penalty will be given for incorrect answers.
- Do not bend, fold or soil your MCQ Answer Sheet.
1. Which of the following statements is true?
   A. An object can be created without a class.
   B. Unit testing tests the interactivity of objects, while integration testing tests the interactivity of classes.
   C. An argument for a method is also known as an actual parameter.
   D. A class is an instance of an object.
   E. None of the above.

2. Which of the following statements is true?
   A. `a123_456` is not a valid Java identifier.
   B. Every Java class must contain a main method.
   C. The result of the operation
     \[
     1 + 2 + "abc"
     \]
     is "12abc"
   D. A default constructor is used if no constructor is provided for a class.
   E. All of the above.

3. A Java `.class` file contains the _______.
   A. bytecodes
   B. source code
   C. compiler
   D. API
   E. None of the above.

4. What is the value assigned to \( x \)?
   \[
   \text{double } x = 50 + 13 / 3 * 1.2;
   \]
   A. 25.2
   B. 53.61111...
   C. 54.8
   D. 55.2
   E. 64.8
5. What is the output of the following code fragment?

```java
int a, b = 7, c = 5;
if (b++ > 7) a = ++b + c++;
else a = ++b - c++;
System.out.println("" + a + " " + b + " " + c);
```

A. 14 9 6
B. 14 8 6
C. 4 9 6
D. 3 9 6
E. 2 8 6

6. Which of the following variable declarations would generate a compile-time error?

A. int a, b, c;
B. float f = 123F;
C. double g = 12.34E-5;
D. int x, float y;
E. None of the above.

7. Assume that `getAge` is an instance method of the `Person` class and `katie` is a `Person` object. Which of the following represents a valid method call?

A. katie.getAge(Person);
B. katie = Person.getAge();
C. katie.getAge();
D. Person = katie.getAge();
E. None of the above.

8. What is the output of the following code?

```java
String str = "";
short score = 2;
switch (score) {
    case 0: 
    case 1: str += "A";
    case 2: 
    case 3: str += "B";
    case 4: str += "C"; break;
    default: str += "D";
}
System.out.println(str);
```

A. (no output; str contains empty string)
B. B
C. C
D. BC
E. BCD
9. Given the following code, which of the following statements is true?

```java
public class Circle {
    private double radius;

    public Circle (double radius) {
        radius = radius;
    }

    public static void main (String[] args) {
        ...
    }
}
```

A. The program can compile, but you cannot create a Circle object with a specified radius.
B. The program can compile, but you cannot create a Circle object by using the statement
   ```java
   Circle c = new Circle(5.2);
   ```
   which will give a run-time error.
C. The program cannot compile because the constructor should not contain any formal parameter.
D. The program cannot compile because of the error in the assignment statement.
E. The program cannot compile because there is no accessor or mutator method.

10. Assuming that all the variables are of type `int`, what is computed in `x`?
    ```java
    x = (n2 >= n3) ? ( (n3 <= n1) ? n3 : n1 ) : ( (n1 >= n2) ? n2 : n1 );
    ```

A. The largest value among `n1`, `n2` and `n3`.
B. The smallest value among `n1`, `n2` and `n3`.
C. The median (middle) value among `n1`, `n2` and `n3`.
D. Cannot be determined as it contains logic error.
E. None of the above.
11. What is the output of the following code?

```java
String a = "Midterm";
String b = "Test";
b += a.substring(4);
System.out.println(b);
```

A. term  
B. Testt  
C. Teste  
D. Testerm  
E. Testterm

12. Given an expression consisting of two Boolean expressions `expr1` and `expr2` as follows:

```
expr1 && expr2
```

Which of the following statements is true?

A. `expr2` is redundant.  
B. `expr2` may not be evaluated due to short-circuit evaluation.  
C. `expr2` may not be evaluated due to overloading.  
D. `expr2` will be evaluated regardless of the truth value of `expr1`, in order for the evaluation to be complete and correct.  
E. None of the above.

13. Reading a value before the conditional inside a loop tests that value is known as a/an ______________.

A. priming read  
B. assumed input  
C. anticipated read  
D. loop-and-a-half read  
E. incremental read
14. Given the following method, what does \texttt{whatX(12345)} compute?

```java
public static int whatX (int a) {
    int x = 0, d;

    while (a > 0) {
        d = a % 10;
        if (d%2 == 0) x += d;
        a /= 10;
    }

    return x;
}
```

A. 2  
B. 5  
C. 6  
D. 9  
E. 15

15. What does the method \texttt{whatX(int a)} in question 14 compute?

A. It sums all the digits in \texttt{a}.  
B. It sums the odd digits in \texttt{a}.  
C. It sums the even digits in \texttt{a}.  
D. It counts the number of ‘0’ digit in \texttt{a}.  
E. It counts the number of even digits in \texttt{a}.

16. Given the following code, assume that \texttt{n} is a positive integer and its value does not cause an overflow on \texttt{count}.

```java
int count = 0;
for (int a = n; a > 0; --a)
    for (int b = n/2; b > 0; --b)
        count++;
```

Which of the following statement is equivalent to the code above?

A. \texttt{int count = 2 * n;}  
B. \texttt{int count = n * n;}  
C. \texttt{int count = n * n / 2;}  
D. \texttt{int count = n * (n / 2);}  
E. \texttt{int count = n * (n - 1) / 2;}
17. Given the following statement

```java
Random num = new Random();
```

How do we generate a random integer in the range 5 to 10 inclusive?

i. `num.nextInt(5, 11)`

ii. `num.nextInt(5) + 5`

iii. `num.nextInt(6) + 5`

iv. `num.nextInt() % 6 + 5`

v. `(int) (num.nextDouble() * 6) + 5`

A. (i) and (ii)
B. (iii) and (iv)
C. (iii) and (v)
D. (iv) and (v)
E. (iii), (iv) and (v)

18. Given the following code, what is the output?

```java
private static int MysteryX(int a, int b) {
    if (a > b) return a;
    else return b;
}

public static void main(String[] args) {
    int a = 1, b = 2;
    a = MysteryX(b, a+b);
    b = MysteryX(a+b, a);
    System.out.println("" + a + " " + b);
}
```

Which of the following statement is equivalent to the code above?

A. 1 2
B. 2 3
C. 3 2
D. 3 5
E. Error

19. Which of the following is correct in checking whether a String object str contains the specified value "CS1101"?

A. `if (str == new String("CS1101"))` ...
B. `if (str == "CS1101")` ...
C. `if (str.equals(CS1101))` ...
D. `if (str.equals("CS1101"))` ...
E. `if (str.equals(new "CS1101"))` ...
20. Which of the following statements is true?
   A. Returning objects from methods is the same as returning primitive types from methods.
   B. Instance methods cannot call all other methods of the same class.
   C. In the call-by-value scheme, the memory location of an argument is passed into the parameter of a method.
   D. The keyword “static” is used to define a class method.
   E. None of the above.

21. Given the following codes, what is the output?

```java
public class Guess {
    private static int value1 = 123;
    private int value2;

    public void increment() {
        value1++; value2++;
    }

    public int getValue1() {
        return value1;
    }

    public int getValue2() {
        return value2;
    }
}

public class DemoGuess {
    public static void main(String[] args) {
        Guess guess1 = new Guess();
        Guess guess2 = new Guess();
        guess1.increment();
        guess2.increment();
        System.out.println(guess1.getValue1() + " "+
                           guess1.getValue2() + " "+
                           guess2.getValue1() + " "+
                           guess2.getValue2();
    }
}
```

A. 124 1 125 2
B. 125 1 125 1
C. 124 2 125 2
D. 125 2 125 2
E. 125 125 125 125
22. Checking a condition that must be true before a method is executed is a __________.
   A. precondition assertion  
   B. postcondition assertion  
   C. control flow invariant  
   D. postscription assertion  
   E. unit testing

23. Which of the following statements is true?
   A. Every exception that is thrown must be caught.  
   B. A NumberFormatException is thrown when a number is divided by zero.  
   C. Double.parseDouble is a method that could possibly throw an exception.  
   D. Catch blocks should be listed in order of more general to more specialized exceptions.  
   E. None of the above.

24. What is the output from the following code?
   ```java
   try {
       int num1 = Integer.parseInt("123");
       System.out.println("First is okay");
       int num2 = Integer.parseInt("ijk");
       System.out.println("Second is okay");
   } catch (NumberFormatException e) {
       System.out.println("Error");
   }
   ```
   A. First is okay
      Second is okay
   B. First is okay
      Second is okay
      Error
   C. Error
   D. First is okay
      Error
   E. First is okay
25. Given this code:

```java
public class Confused {
    private int n1, n2, n3;
    public Confused(int n1, int n2, int n3) {
        n2 = n1;
        this.n2 = n3;
        this.n3 = n2;
        n3 = n1;
    }
    public Confused(int n1, int n2) {
        this(n2, n1, n1);
    }
    public String toString() {
        return n1 + " " + n2 + " " + n3;
    }
    public static void main(String[] args) {
        Confused c1 = new Confused(5, 6, 7);
        System.out.println("c1 = " + c1);
        Confused c2 = new Confused(8, 9);
        System.out.println("c2 = " + c2);
    }
}
```

What is the first line of output of the code?

A. `c1 = 7 6 5`
B. `c1 = 0 7 5`
C. `c1 = 5 7 5`
D. `c1 = 0 7 6`
E. `c1 = 5 7 6`

26. Given the code in question 25 above, what is the second line of output?

A. `c2 = 0 8 9`
B. `c2 = 0 9 8`
C. `c2 = 8 8 9`
D. `c2 = 9 9 8`
E. `c2 = 9 9 9`
The Fraction class is defined on page 368 in your textbook. It is reproduced below for your convenience. The next 4 questions refer to this code.

```java
public class Fraction {
    private int numerator;
    private int denominator;

    public Fraction(int num, int denom) {
        setNumerator(num);
        setDenominator(denom);
    }

    public int getDenominator() {
        return denominator;
    }

    public int getNumerator() {
        return numerator;
    }

    public void setDenominator(int denom) {
        if (denom == 0) {
            // Fatal error
            System.err.println("Fatal error");
            System.exit(1);
        }
        denominator = denom;
    }

    public void setNumerator(int num) {
        numerator = num;
    }

    public String toString() {
        return getNumerator() + "/" + getDenominator();
    }

    public Fraction addVersion1(Fraction frac) {
        int a, b, c, d;
        Fraction sum;
        a = this.getNumerator();
        b = this.getDenominator();
        c = frac.getNumerator();
        d = frac.getDenominator();
        sum = new Fraction(a*d + b*c, b*d);
        return sum;
    }

    public void addVersion2(Fraction frac) {
        int a, b, c, d;
        a = this.getNumerator();
        b = this.getDenominator();
        c = frac.getNumerator();
        d = frac.getDenominator();
        setNumerator(a*d + b*c);
        setDenominator(b*d);
    }
}
```
27. What is the output of the following code?

```java
Fraction f1 = new Fraction(1, 2);
Fraction f2 = new Fraction(2, 3);
Fraction f3;

f3 = f1.addVersion1(f2);
System.out.println(f3);
```

A. 7 6
B. 7/6
C. (7, 6)
D. 1.166666666666667
E. Error

28. What is the output of the following code?

```java
Fraction f1 = new Fraction(1, 2);
Fraction f2 = new Fraction(2, 3);
Fraction f3;

f1.addVersion2(f2);
System.out.println(f1 + "; " + f2);
```

A. 7 6; 7 6
B. 7/6; 7/6
C. 7/6; 2/3
D. 1.166666666666667; 0.666666666666667
E. Error

29. What is the output of the following code?

```java
Fraction f1 = new Fraction(1, 2);
Fraction f2 = new Fraction(2, 3);
Fraction f3;

f3 = f1.addVersion1(f2.addVersion1(f1));
System.out.println(f3);
```

A. 20 12
B. 20/12
C. 5/3
D. 1.666666666666667
E. Error
30. What is the output of the following code?

```java
Fraction f1 = new Fraction(1, 2);
Fraction f2 = new Fraction(2, 3);
Fraction f3;

f1.addVersion2(f2.addVersion2(f1));
System.out.println(f1);
```

A. 20 12  
B. 20/12  
C. 5/3  
D. 1.666666666666667  
E. Error

**Bonus question.**

31. How many discussion leaders are there in CS1101X and what is the date of the CS1101X examination paper?

A. 9 leaders; Exam on 17 November 2005  
B. 9 leaders; Exam on 18 November 2005  
C. 9 leaders; Exam on 19 November 2005  
D. 10 leaders; Exam on 17 November 2005  
E. 10 leaders; Exam on 18 November 2005

=== THE END ===