CITS1001 Object-Oriented Programming and Software Engineering

School of Computer Science & Software Engineering
The University of Western Australia

MID-SEMESTER TEST 2017

Name	
Student Number	

- This Paper contains 12 pages, 15 questions. Each question is worth 1 mark for a total of 15 marks.
- Candidates should answer all 15 questions on the machine readable answer sheet provided.
- Mark your answers by filling in the appropriate circles 1 to 15 on the answer sheet. Ignore questions 16-125.
- Write your name and student number on both the question sheet and answer sheet and also fill in the name and number circles.
- The papers will be marked by an automatic scanner so make sure that your selections are clear.
- Use the blank pages at the end of the question paper for rough work.
- Students will not be allowed to leave the room during the test (except in an emergency). If you finish early, please check your answers and sit quietly.

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1. What sort of variables are used to store the state of an individual object?

   a. Local variables.

   b. Parameter variables.

   c. Primitive variables.

   d. Reference variables.

   e. Field variables.

2. Suppose a class `ClockDisplay` includes the declaration
   `private NumberDisplay hours;`
   What does `setValue` refer to in the statement `hours.setValue(11);`

   a. It is a field belonging to the class `NumberDisplay`.

   b. It is a method belonging to the class `NumberDisplay`.

   c. It is a method belonging to the object `hours`.

   d. It is a method belonging to an object of type `ClockDisplay`.

   e. It is a field belonging to the object `hours`.

3. A class `Book` has the following fields:

   ```
   private String author;
   private String title;
   private int yearPublished;
   private int pages;
   ```

   Which of the following method signatures would be most appropriate for a method `mostRecent` that returns the publication year of the most recently published book in a collection of books.

   a. `public void mostRecent()`

   b. `private int mostRecent()`

   c. `public int mostRecent(ArrayList<Book> booklist)`

   d. `public Book mostRecent(ArrayList<Book> booklist)`

   e. `public String mostRecent(Book book)`

4. Consider the variable declaration:

```
Student fred;
```

Which of the following best describes the effect of this code.

a. It calls the `Student` class constructor

b. It creates a `Student` object called `fred`

c. It initializes the variable `fred` to the value 0

d. It creates a variable called `fred` of type `Student`

e. It is invalid because you cannot declare an object without initializing it

5. Which sentence best describes the value of the variable `c3` after the following code is run.

```
Circle c1, c2, c3;
c1 = new Circle();
c1.moveHorizontal(100);
c1.changeColor("red");
c2 = new Circle();
c1 = c2;
c3 = c1;
```

a. Nothing — compilation fails at line 3 because the method call does not have a target object.

b. A reference to a `Circle` object with red colour.

c. A reference to a newly created default `Circle` object.

d. A reference to an incorrectly constructed `Circle` object.

e. `null` since object `c3` has not been constructed.

6.
```
public class BankAccount {

  private int balance;
  private int total;

  public BankAccount(int balance) {
      this.balance = balance;
      total = balance;
  }

  public void deposit(int amount) {
      balance = balance + amount;
      total = total + amount;
  }

  public void withdraw(int amount) {
      balance = balance - amount;
      total = total + amount;
  }

  public int getBalance() { return balance; }

  public int getTotal() { return total; }
  }
```

Given the class definition of `BankAccount` above, what would be printed by the following code?

```
BankAccount b1 = new BankAccount(1000);
BankAccount b2 = new BankAccount(500);
b1.deposit(1500);
b2.withdraw(200);
b1.deposit(b2.getBalance());
System.out.println(b1.getTotal() + " and " + b2.getTotal());
```

a. 300 and 2800

b. 1000 and 500

c. 1700 and 700

d. 2500 and 700

e. 2800 and 700

7. The variable `int runTime` contains the running time of a movie in minutes. You wish to convert it to the normal hours and minutes notation (e.g. 123 minutes gives hours=2 hours and minutes=3). Which are the correct lines of code for this task ?

   a.
   ```
   int hours = runTime / 60;
   int minutes = (runTime - hours * 60) / 60;
   ```

   b.
   ```
   int hours = runTime % 60;
   int minutes = runTime;
   ```

   c.
   ```
   int hours = runTime / 60;
   int minutes = runTime % 60;
   ```

   d.
   ```
   int hours = runTime / 60;
   int minutes = runTime / 60 * minutes;
   ```

   e.
   ```
   int hours = runTime % 60;
   int minutes = runTime / 60;
   ```

8. What is the result of evaluating of the expression `3 < 5 == 5 > 3`

   a. It causes a syntax error.

   b. It causes a type error.

   c. It causes a run-time error.

   d. It evaluates to `false`.

   e. It evaluates to `true`.

9. What is the value of array element `a[99]` after executing the following statements?

```
int[] a = new int[100];
a[0] = 1;
for (int i = 1; i < a.length; i++) {
    a[i] = 1 - a[i-1];
}
```

a. -2

b. -1

c. 0

d. 1

e. 2

10. What is the value of the expression `s1+s2+s3` after the following statements are executed?

```
String s1 = "have ";
String s2 = "some ";
String s3 = "fun ";
s2 = s3;
s3 = s1;
s1 = s2;
```

a. `"have some fun "`

b. `"fun some have "`

c. `"fun fun have "`

d. `"s1+s2+s3"`

e. None of the above.

11. What does `bMystery(false, false)` return ?

```
public int bMystery(boolean b1, boolean b2)
{
          if (b1 && b2) {
               return 100;
          } else if (b1 || b2) {
               return 200;
          } else {
           return 300;
          }
}
```

a. 100

b. 200

c. 300

d. true

e. false

12. How many of these statements apply to a large program written in good object-oriented style?

- The problem is decomposed into several classes.
- Each class provides a narrow range of well-defined services.
- Each class hides its implementation details as far as possible.
- Objects communicate as little as possible at runtime.

a. 0

b. 1

c. 2

d. 3

e. 4

13. The following method is intended to count the number of marks that are in the range low to high (inclusive), but it is missing one line of code.

```
public int countNumInRange(int low, int high)
{
        int count=0;
        for (StudentMark sm : marks) {
            //missing line of code here
            {
                count++;
            }
        }
        return count;
}
```

Which of the following lines of code should replace the comment line (`//missing line of code here`) so that the method returns the correct result ?

a. `if (low < sm.getMark())`

b. `if (high > sm.getMark())`

c. `if ((low <= sm.getMark()) || (sm.getMark() <= high))`

d. `if ((low <= sm.getMark()) && (sm.getMark() <= high))`

e. `if (low < high)`

14. The following method is logically incorrect. It is intended to find the maximum balance of a BankAccount object from a collection of BankAccount objects.

```
public int highestBalance( ArrayList<BankAccount> customers)
{
    int max = 0;
    for (BankAccount acc : customers) {
        if ( acc.getBalance() > max) {
            max = acc.getBalance();
        }
     }
    return max;
}
```

Which of the following statements best describes a situation in which `highestBalance` returns the wrong result ?

a. It fails whenever there is at least one BankAccount with a zero balance.

b. It fails whenever there are two or more BankAccounts with the same maximum balance.

c. It fails when every BankAccount has a negative balance.

d. It fails whenever the first customer has the highest balance.

e. It fails whenever the customer collection contains only one BankAccount.

15. What is the effect of executing the following Java statements?

```
ArrayList<Employee> staff = new ArrayList<Employee>();
for (int i = 0; i < 20; i++) {
     staff.add(new Employee());
}
```

a. An `Employee` object representing an organisation with twenty staff is created

b. A list containing twenty newly constructed `Employee` objects is created.

c. A list variable is created, and initialized to the default value `null`

d. A list containing twenty `null` objects is created.

e. Twenty variables, each referring to an objects of type `Employee` are created.

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