THE UNIVERSITY OF WESTERN AUSTRALIA

School of Computer Science & Software Engineering

CITS1001 OBJECT-ORIENTED PROGRAMMING AND SOFTWARE ENGINEERING

MID-SEMESTER TEST

Semester 1, 2012
CITS1001

This Paper Contains:
12 Pages
15 Questions

Time allowed : **FORTY (40) MINUTES**

Marks for this paper total 15.
Candidates should answer **ALL** questions on the machine readable answer sheet provided.

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1. Consider the following method (with line numbers):

```
1. public boolean justAMethod(String name, Int mark){
2.     boolean n = false;
3.     if ( name.equals("anon") {
4.        return n;
5.     }  else {
6.         return (mark*2);
7.     }
8.  }
```

   Compiler errors would be reported for:

   a. line 1

   b. lines 1 and 6

   c. lines 1, 4 and 6

   d. lines 1, 3 and 6

   e. lines 1 and 3

2. The `Picture` class of the `shapes` project studied in lectures and labs includes the declaration `private Triangle roof;`

   In the statement `roof.moveHorizontal(20);` what does `moveHorizontal` refer to?

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

   b. It is a field belonging to the object `roof`.

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

   d. It is a method belonging to the class `Triangle`.

   e. It is a method belonging to the class `Picture`.

3. What are the values in each of the variables after the following code has been executed:

```
int x = 7;
int y = 5;
int z = 0;
z = x;
x = y;
y = z;
```

a. x is 7, y is 5, z is 0

b. x is 5, y is 0, z is 7

c. x is 5, y is 5, z is 0

d. x is 5, y is 7, z is 7

e. None of the above.

4. 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. 133 minutes = 2 hours and 13 minutes). Which piece of code is correct?

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

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

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

d.
```
int minutes = runTime % 60;
int hours = runTime - 60 * minutes;
```

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

5. Consider the following block of code, where variables a, b and c each store integer values:

```
if (a > b) {
    if (b > c) {
        System.out.println(c);
    } else {
        System.out.println(b);
    }
} else if (a > c) {
    System.out.println(c);
} else {
    System.out.println(a);
}
```

Which one of the following initial values for the variables will cause the value in variable `b` to be printed?

a. `a` is 2, `b` is 1, `c` is 1

b. `a` is 1, `b` is 1, `c` is 2

c. `a` is 3, `b` is 2, `c` is 1

d. `a` is 1, `b` is 3, `c` is 2

e. `a` is 1, `b` is 2, `c` is 3

6. We have two monkeys, a and b, and the parameter variables `aSmile` and `bSmile` indicate if each is smiling. We are in trouble if they are both smiling or if neither of them is smiling. Which of the following statements returns true if and only if we are in trouble.

a. `return ((aSmile == bSmile) || (aSmile != bSmile));`

b. `return ((aSmile && bSmile) || (!aSmile || !bSmile));`

c. `return (aSmile || bSmile);`

d. `return (aSmile && bSmile);`

e. `return (aSmile == bSmile);`

7. The following method from the `MarksAnalyser` class used in labs 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;
}
```

What 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)`

8. What value does `mystery(100)` return?

```
public int mystery(int k){
     while ( k>10 ) {
         k = k/2;
     }
     return k;
}
```

a. 2

b. 6

c. 100

d. 12

e. 5

9. What value does `someMethod(6)` return ?

```
public int someMethod(int n) {
    if (n > 1) {
        int[] a = new int[n];
        a[0] = 1;
        a[1] = 1;
        for (int i = 2; i < n; i++) {
            a[i] = a[i-1] + a[i-2];
        }
        return a[n-1];
    } else {
        return -1;
    }
}
```

a. 1

b. 2

c. 5

d. 8

e. 13

10. Consider the following class definition

```
public class BankAccount {
  private int balance;

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

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

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

  public int getBalance() {
    return balance;
  }

  public void bankDemo() {
    BankAccount b1 = new BankAccount(1000);
    BankAccount b2 = new BankAccount(500);
    b1.deposit(1500);
    b2.withdraw(200);
    b1.deposit(b2.getBalance());
    System.out.println(b1.getBalance() + " and "  + b2.getBalance());
 }
}
```

What would be printed to the terminal screen when the method `bankDemo()` is executed?

a. 1700 and 1700

b. 2500 and 1300

c. 2800 and 300

d. 3100 and 3100

e. 3500 and 3500

11. The following implementation of the discount method of the `TicketMachine` class studied in lectures and labs contains an error.

```
public void discount(int amount)
{
    if ((0 < amount) || (amount > price)) {
        price = price - amount;
    } else {
        System.out.println("Discount is too large");
    }
}
```

Supposing you have created a JUnit test object `ticket200 = new TicketMachine(200);` Which of the following JUnit test cases will fail, so alerting you to the error.

a. `ticket200.discount(50);`
`assertEquals(150,ticket200.getPrice());`

b. `ticket200.discount(25);`
`assertEquals(125,ticket200.getPrice());`

c. `ticket200.discount(-10);`
`assertEquals(200,ticket200.getPrice());`

d. `ticket200.discount(200);`
`assertEquals(200,ticket200.getPrice());`

e. `ticket200.discount(250);`
`assertEquals(200,ticket200.getPrice());`

Comment on the answer:
The given code would pass the tests in a and c, and fail those in b,d,e. Assuming the the correct implementation uses `if ((0 < amount) && (amount <= price)) ...` *then the correct code would pass the tests in a, c and e, and fail those in b and d. In this case, only option e fails with the given code but would pass with the correct code, and so e is the best choice for a test to "fail, so alerting you to the error." This correctness assumption allows a 100% discount, but not more than 100% and discount must be greater than 0% (or it would not be a discount).*

12. The source code for a class

    a. must explicitly define exactly one constructor.

    b. must explicitly define at least one constructor.

    c. must explicitly define at most one constructor.

    d. can explicitly define zero, one or more constructors.

    e. should never contain any explicitly defined constructors.

13. The declaration `private Circle sun;`

    a. creates a field variable `sun` referring to a newly created `Circle` object, which by default has the colour yellow.

    b. creates a field variable `sun` with initial value `null`.

    c. creates a field variable `sun` that is drawn in the middle of the canvas.

    d. creates a field variable `sun` with an unspecified initial value.

    e. causes a syntax error, as it is not permitted to declare a variable of reference type without creating the associated object.

14. Which of these statements apply to a large program written in good object-oriented style?

    1. Objects are capable of many complex tasks and communicate as little as possible during runtime.
    2. Complex problems are solved by the co-operation of objects from several different classes.
    3. Each class of objects provides a narrow range of well-defined services.
    4. In carrying out their tasks, objects act as clients or servers but never both, during runtime.

    a. 1 and 2 only

    b. 2 and 3 only

    c. 3 and 4 only

    d. 1 and 4 only

    e. 2, 3 and 4 only

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

    a. Local variables.

    b. Field variables.

    c. Reference variables.

    d. Parameter variables.

    e. Method variables.

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