Object-oriented Programming and Software Engineering CITS1001

Multiple-choice Mid-semester Test

Semester 1, 2016

- Mark your solutions on the provided answer page, by filling in the appropriate circles.

- Write your name and student number on the answer sheet, and also fill in the circles for both.

- The papers will be marked by an automatic scanner, so make sure that your selections are clear.

- There are fifteen questions: ignore options 16–125 on the answer sheet.

- Use the blank pages at the end for rough work.

- Feel free to separate the answer sheet from the question sheets, but hand in both at the end of the test.

- The time allowed is forty minutes.
1. What value does mystery(918273) return?

```java
public static String mystery(int x)
{
    String s = "";
    for (int k = x; k > 0; k = k / 10)
    {
        if (k % 2 == 0) s = s + k % 10;
        else s = k % 10 + s;
    }
    return s;
}
```

a) "372819"
b) "823719"
c) ""
d) "917328" ***
e) "918273"

2. Given int variables x and y, y ≠ 0, what is the value of this expression?

\[ x \% y / y \]

a) 0 ***
b) 1
c) x
d) x \% y
e) x / y

3. Which of these expressions evaluates to false for all possible values of a?

a) !!a
b) a || !a

c) !a && a *** There were (accidentally) two correct answers to this question
d) a == a
e) (a || a) == !(a && a) ***
4. Seven months of the year have 31 days: Months 1 (January), 3, 5, 7, 8, 10, and 12. 
longMonth(m) is meant to return true if and only if m denotes one of these 
months. However, the following definition contains a logical error. For which of these 
inputs does it give the wrong answer?

```java
public static boolean longMonth(int m)
{
    return m % 2 != m / 9;
}
```

a) 6  
b) 7  
c) 8 ***  
d) 9  
e) 10 

5. Which of these uses the correct syntax to add an object x to an ArrayList xs?

a) xs.add(1, x) ***  
b) xs.add(x, 1)  
c) add(x, 1, xs)  
d) x.add(1, xs)  
e) x.add(xs, 1) 

6. What are the values of m and n after these statements?

```java
int m, n;
m = 12;
 n = n + m;
m = m - n;
n = n + m;
```

a) 0, 12 ***  
b) 12, 0  
c) 12, 12  
d) 12, 24  
e) 24, 12
7. What value does `arraymethod()` return?

```java
public static int arraymethod()
{
    int[] xs = new int[100];
    xs[0] = 4;
    xs[1] = 2;
    xs[2] = 0;
    for (int k = 3; k < 100; k++)
        xs[k] = -xs[k-3];
    return xs[99];
}
```

a) −4 ***
b) −2
c) 0
d) 2
e) 4

8. What is the defining feature of a static variable in a class `C`?

a) It can be assigned to only once.
b) It is shared between all objects belonging to `C`. ***
c) It is accessible only by objects belonging to `C`.
d) It is stored on the heap.
e) It exists only while an object belonging to `C` exists.

9. If a class has multiple constructors, they must all have

a) different names.
b) different visibility.
c) different argument types. ***
d) different return types.
e) different bodies.
10. What value does whileloop(2, -1) return?

```java
public static int whileloop(int a, int b) {
    while (a > b) {
        a = a * b;
        b = a + b;
    }
    return b;
}
```

a) -3  
b) 3  
c) 6  
d) 18  
e) 21 ***

11. Given an int variable x, which expression returns its tens digit? For example, the tens digit of 9251 is 5.

a) x / 10 % 100  
b) x % 100 / 100  
c) x % 10 / 10  
d) x / 10 % 10 ***  
e) x / 100 % 10

12. Which of these evaluates to the same result as the expression 88 - 66 / 5 / 3?

a) 88 - ((66 / 5) / 3) ***  
b) (88 - (66 / 5)) / 3  
c) (88 - 66) / (5 / 3)  
d) ((88 - 66) / 5) / 3  
e) 88 - (66 / (5 / 3))
13. If \( zs \) is initially a long list, how many elements does it lose (i.e. how much shorter is it) from the call `shorten(zs, n)`?

```java
public static void shorten(ArrayList<String> xs, int n)
{
    for (int k = 0; k < n; k++)
        if (k % 2 == 0)
            {xs.remove(0);
             xs.remove(0);}
}
```

a) 0
b) \( n/2 \)
c) \( n \) ***
d) \( 2n \)
e) \( n^2 \)

14. What does this declaration create?

```java
private ArrayList<Company> taxcheats;
```

a) A variable `taxcheats` whose initial value is unspecified.
b) A variable `taxcheats` with the initial value `null`. ***
c) A variable `taxcheats` that points to an empty `ArrayList`.
d) A variable `taxcheats` that points to an `ArrayList` with space for ten objects.
e) A variable `taxcheats` that contains all `Company` objects known to the program.

15. Which best describes the effect of these statements on the `int` variables \( x \) and \( y \)?

```java
x = x * y;
y = x / y;
\( x = x / y \);
```

a) The values of the variables are unchanged.
b) The values of the variables are swapped. ***
c) Both variables have the initial value of \( x \).
d) Both variables have the initial value of \( y \).
e) One variable has the product of their initial values, the other has the ratio.