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`
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) \( x / 10 \mod 100 \)  
b) \( x \mod 100 / 100 \)  
c) \( x \mod 10 / 10 \)  
d) \( x / 10 \mod 10 \)  
e) \( x / 100 \mod 10 \)

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)`?

    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?

    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 a `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`?

    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.