Object-oriented Programming and Software Engineering CITS1001

Multiple-choice Mid-semester Test

Semester 1, 2015

- 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(12345678)` return?

```java
public String mystery(int n)
{
    String soln = "";
    while (n > 0)
    {
        soln = n % 10 + soln;
        n = n / 100;
    }
    return soln;
}
```

a) “1357”
b) “2468” ***
c) “7531”
d) “8642”
e) It causes a run-time error.

2. What is the value of this expression?

```
75.6 / 4 % 6
```

a) 0.0
b) 0.9 ***
c) 18.0
d) 18.9
e) It causes a type error.

3. Which of these expressions evaluates to `true` for all possible values of `a` and `b`?

a) `a > a`
b) `a == a == b`
c) `a && !b || b`
d) `!a || b || a` ***
e) `!b`
4. `either7or9(n)` is meant to return `true` if `n` is a multiple of exactly one of 7 or 9, and `false` otherwise. However, the following attempted definition contains a logical error. Which of these inputs does it give the wrong answer for?

```java
public boolean either7or9(int n)
{
    return n % 7 != 0 || n % 9 != 0;
}
```

a) 0
b) 79 ***
c) 81
d) 84
e) 126

5. What does `Building` refer to in this line of code?

```java
b = new Building(area, code);
```

a) It is a constructor belonging to the class `Building`. ***
b) It is an instance variable belonging to the object `b`.
c) It is an instance variable belonging to the class `Building`.
d) It is a method belonging to the object `b`.
e) It is a method belonging to the class `Building`.

6. What sort of variable has the widest scope in a Java program?

a) Loop-control variable
b) Local variable
c) Parameter variable
d) Instance variable
e) Class variable ***
7. What value does `arraymethod([6, 7, 8, 9, 10])` return?

```java
public int arraymethod(int[] xs) {
    int[] ys = xs;
    ys[ys.length - 1] = 100;
    ys = new int[] {4, 3, 2, 1};
    ys[ys.length - 1] = 1000;
    return xs[xs.length - 1];
}
```

a) 1  
b) 10  
c) 100 ***  
d) 1000  
e) It causes an array-indexing error.

8. What are the legal values for indexing an `ArrayList` containing `k` elements?

a) –`k` to `k–1` inclusive  
b) `0` to `k–1` inclusive ***  
c) `1` to `k` inclusive  
d) `k–1` or smaller  
e) `k` or smaller

9. If `x` is a `double`, which of these expressions returns its third most-significant decimal digit? (e.g. if `x = 35.47871`, it should return 8.) The method `Math.round` takes a `double` `n` and returns the closest `int` to `n`.

```java
Math.round takes a double \( n \) and returns the closest int to \( n \).
```

a) `(int) (x * 1000 % 10)` ***  
b) `Math.round(x * 1000 % 10)`  
c) `x * 1000 % 10`  
d) `(int) (x % 10 * 1000)`  
e) `Math.round(x % 10 * 1000)`
10. If \( zs \) is initially a long list, how many elements does it lose (i.e. how much shorter is it) from the call \( \text{shorten}(zs, n) \)?

```java
public void shorten(ArrayList<String> xs, int n) {
    for (int k = 0; k < n; k++) {
        xs.remove(0);
        xs.remove(xs.size() - 1);
    }
}
```

a) 0  
b) \( n \)  
c) \( 2n \)  
d) \( n^2 \)  
e) It crashes with an indexing error.

11. Which answer best describes the effect of these statements on the variables \( x \) and \( y \)?

\[
\begin{align*}
x &= x + y; \\
y &= x - y; \\
x &= x - y;
\end{align*}
\]

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

12. What is the defining feature of a static method in a Java class?

a) It doesn’t change the state of any object.  
b) Its body has no loops.  
c) It doesn’t take any formal parameters.  
d) Its return value is independent of any object’s state.  
e) It doesn’t return a result.
13. What value does `forloop(5)` return?

```java
public int forloop(int b) {
    for (int a = 10; a > -10; a = a - 5)
        if (a % 2 == 0)
            b = b + a;
        else b = b * 2;
    return b;
}
```

a) 5
b) 15
c) 40
d) 50
e) 60 ***

14. What does this declaration create?

```java
private Rectangle square;
```

a) A variable `square` whose initial value is unspecified.
b) A variable `square` with the initial value `null`.***
c) A variable `square` that points to a `Rectangle` object on the screen.
d) A variable `square` that points initially to a `Rectangle` object with both sides 0.
e) A variable `square` that points to a `Rectangle` object whose sides must be equal.

15. How many constructors is a class allowed to have in Java?

a) Exactly 0
b) 0 or 1
c) 0 or more ***
d) Exactly 1
e) 1 or more