

9.1 Which statement is true?

Select the one correct answer.

- (a) Objects can be explicitly destroyed using the keyword delete.
- (b) An object will be garbage collected immediately after it becomes unreachable.
- (c) If object obj1 is accessible from object obj2, and object obj2 is accessible from obj1, then obj1 and obj2 are not eligible for garbage collection.
- (d) Once an object has become eligible for garbage collection, it will remain eligible until it is destroyed.
- (e) If object obj1 can access object obj2 that is eligible for garbage collection, then obj1 is also eligible for garbage collection.

9.2 Identify the location in the following program where the object, initially referenced with arg1, is eligible for garbage collection.

```
public class MyClass {
    public static void main(String[] args) {
        String msg;
        String pre = "This program was called with ";
        String post = " as first argument.";
        String arg1 = new String((args.length > 0) ? "" + args[0] + "" :
            "<no argument>");

        msg = arg1;
        arg1 = null;           // (1)
        msg = pre + msg + post; // (2)
        pre = null;          // (3)
        System.out.println(msg);
        msg = null;          // (4)
        post = null;         // (5)
        args = null;         // (6)
    }
}
```

Select the one correct answer.

- (a) After the line labeled (1).
- (b) After the line labeled (2).
- (c) After the line labeled (3).
- (d) After the line labeled (4).
- (e) After the line labeled (5).
- (f) After the line labeled (6).

9.3 How many objects are eligible for garbage collection when control reaches (1)?

```
public class Eligible {
    public static void main(String[] args) {
        for (int i = 0; i < 5; i++) {
            Eligible obj = new Eligible();
            new Eligible();
        }
        System.gc(); // (1);
    }
}
```

Select the one correct answer.

- (a) 0.
- (b) 5.
- (c) 10.
- (d) Hard to say.

9.4 How many objects are eligible for garbage collection when control reaches (1)?

```
public class Link {
    private Link next;
    Link(Link next) { this.next = next; }
    public void finalize() { System.out.print("X"); }
    public static void main(String[] args) {
        Link p = null;
        for (int i = 0; i < 5; i++) {
            p = new Link(p);
        }
        System.gc(); // (1);
    }
}
```

Select the one correct answer.

- (a) 0
- (b) 5
- (c) 10
- (d) Hard to say

9.5 How many objects are eligible for garbage collection when control reaches (1)?

```
public class Elements {
    public static void main(String[] args) {
        int[] array = new int[4];
        for (int i = 0; i < 4; i++) {
            array[i] = i;
        }
        array[0] = array[1] = array[2] = array[3] = 0;
        System.gc(); // (1);
    }
}
```

Select the one correct answer.

- (a) 0
- (b) 1
- (c) 4
- (d) Hard to say.

9.6 How many objects are reachable when control reaches (1)?

```
public class Nullify {
    private static void nullify(Integer[] array) { array = null; }
    public static void main(String[] args) {
        Integer[] array = new Integer[4];
        for (int i = 0; i < 4; i++) {
            array[i] = i;
        }
        nullify(array);
        System.gc(); // (1);
    }
}
```

Select the one correct answer.

- (a) 0
- (b) 1
- (c) 4
- (d) 5
- (e) Hard to say.

9.7 Which statement is true?

Select the one correct answer.

- (a) If an exception is thrown during the execution of the finalize() method of an eligible object, the exception is ignored and the object is destroyed.
- (b) All objects have a finalize() method.
- (c) Objects can be destroyed by explicitly calling the finalize() method.
- (d) The finalize() method can be declared with any accessibility.
- (e) The compiler will fail to compile code that defines an overriding finalize() method that does not explicitly call the overridden finalize() method from the superclass.

9.8 Which statement is true?

Select the one correct answer.

- (a) The compiler will fail to compile code that explicitly tries to call the finalize() method.
- (b) The finalize() method must be declared with protected accessibility.
- (c) An overriding finalize() method in any class can always throw checked exceptions.
- (d) The finalize() method can be overloaded.
- (e) The body of the finalize() method can only access other objects that are eligible for garbage collection.

9.9 Which statement describes guaranteed behavior of the garbage collection and finalization mechanisms?

Select the one correct answer.

- (a) Objects will not be destroyed until they have no references to them.
- (b) The finalize() method will never be called more than once on an object.
- (c) An object eligible for garbage collection will eventually be destroyed by the garbage collector.
- (d) If object A became eligible for garbage collection before object B, then object A will be destroyed before object B.
- (e) An object, once eligible for garbage collection, can never become accessible by a live thread.

9.10 Which method headers will result in a correct implementation of a finalizer for the following class?

```
public class Curtain {
    // (1) INSERT METHOD HEADER HERE ...
    {
        System.out.println("Final curtain");
        super.finalize();
    }
}
```

Select the two correct answers.

- (a) void finalize() throws Throwable
- (b) void finalize() throws Exception
- (c) void finalize()
- (d) protected void finalize() throws Throwable
- (e) protected void finalize() throws Exception
- (f) protected void finalize()
- (g) public void finalize() throws Throwable
- (h) public void finalize() throws Exception
- (i) public void finalize()
- (j) private void finalize() throws Throwable
- (k) private void finalize() throws Exception
- (l) private void finalize()

9.11 Which scenario cannot definitely be the result of compiling and running the following program?

```
public class Grade {
    private char grade;
    Grade(char grade) { this.grade = grade; }
    public void finalize() throws Throwable {
        System.out.print(grade);
        super.finalize();
    }
    public static void main(String[] args) {
        new Grade('A'); new Grade('F');
        System.gc();
    }
}
```

Select the one correct answer.

- (a) The program may print AF.
- (b) The program may print FA.
- (c) The program may print A.
- (d) The program may print F.
- (e) The program may print AFA.
- (f) The program may not print anything.

9.12 Which scenario can be the result of compiling and running the following program?

```
public class MyString {
    private String str;
    MyString(String str) { this.str = str; }
    public void finalize() throws Throwable {
        System.out.print(str);
        super.finalize();
    }
    public void concat(String str2) {
        this.str.concat(str2);
    }
    public static void main(String[] args) {
        new MyString("A").concat("B");
        System.gc();
    }
}
```

Select the two correct answers.

- (a) The program may print AB.
- (b) The program may print BA.
- (c) The program may print A.
- (d) The program may print B.
- (e) The program may not print anything.

9.13 Given the following class, which of these static initializer blocks can be inserted at (1)?

```
public class MyClass {
    private static int count = 5;
    final static int STEP = 10;
    boolean alive;
    // (1) INSERT STATIC INITIALIZER BLOCK HERE
}
```

Select the three correct answers.

- (a) static { alive = true; count = 0; }
- (b) static { STEP = count; }
- (c) static { count += STEP; }
- (d) static ;
- (e) static {;}
- (f) static { count = 1; }

9.14 What will be the result of compiling and running the following program?

```
public class MyClass {
    public static void main(String[] args) {
        MyClass obj = new MyClass(n);
    }
    static int i = 5;
    static int n;
    int j = 7;
    int k;
    public MyClass(int m) {
        System.out.println(i + ", " + j + ", " + k + ", " + n + ", " + m);
    }
    { j = 70; n = 20; } // Instance Initializer Block
    static { i = 50; } // Static Initializer Block
}
```

Select the one correct answer.

- (a) The code will fail to compile because the instance initializer block tries to assign a value to a static field.
- (b) The code will fail to compile because the field k will be uninitialized when it is used.
- (c) The code will compile and print 50, 70, 0, 20, 0, when run.
- (d) The code will compile and print 50, 70, 0, 20, 20, when run.
- (e) The code will compile and print 5, 70, 0, 20, 0, when run.
- (f) The code will compile and print 5, 7, 0, 20, 0, when run.

9.15 Given the following class, which instance initializer block inserted at (1) will allow the class to be compiled?

```
public class MyClass {
    static int gap = 10;
    double length;
    final boolean active;
    // (1) INSERT CODE HERE
}
```

Select the one correct answer.

- (a) instance { active = true; }
- (b) MyClass { gap += 5; }
- (c) { gap = 5; length = (active ? 100 : 200) + gap; }
- (d) { ; }
- (e) { length = 4.2; }
- (f) { active = (gap > 5); length = 5.5 + gap; }

9.16 What will be the result of compiling and running the following program?

```
public class Initialization {
    private static String msg(String msg) {
        System.out.println(msg); return msg;
    }
    public Initialization() { m = msg("1"); }
    { m = msg("2"); }
    String m = msg("3");
    public static void main(String[] args) {
        Object obj = new Initialization();
    }
}
```

Select the one correct answer.

- (a) The program will fail to compile.
- (b) The program will compile, and print 1, 2, and 3, when run.
- (c) The program will compile, and print 2, 3, and 1, when run.
- (d) The program will compile, and print 3, 1, and 2, when run.
- (e) The program will compile, and print 1, 3, and 2, when run.

9.17 What will be the result of compiling and running the following program?

```
public class Initialization {
    private static String msg(String msg) {
        System.out.println(msg); return msg;
    }
    static String m = msg("1");
    { m = msg("2"); }
    static { m = msg("3"); }
    public static void main(String[] args) {
        Object obj = new Initialization();
    }
}
```

Select the one correct answer.

- (a) The program will fail to compile.
- (b) The program will compile and print 1, 2, and 3, when run.
- (c) The program will compile and print 2, 3, and 1, when run.
- (d) The program will compile and print 3, 1, and 2, when run.
- (e) The program will compile and print 1, 3, and 2, when run.

9.18 Which of the labeled lines in the following code can be uncommented by removing the // characters and still allow the code to compile correctly?

```
class GeomInit {
    //int width = 14;      /* Line A */
    {
        area = width * height;    /* Line B */
    }
    int width = 37;
    {
        height = 11;      /* Line C */
    }
    int height, area;
    //area = width * height;    /* Line D */
    {
        int width = 15;      /* Line E */
        area = 100;
    }
};
```

Select the two correct answers.

- (a) Line A
- (b) Line B
- (c) Line C
- (d) Line D
- (e) Line E