

1. Consider the following method.

```
public static int mystery(int[] arr)
{
    int x = 0;

    for (int k = 0; k < arr.length; k = k + 2)
        x = x + arr[k];

    return x;
}
```

Assume that the array `nums` has been declared and initialized as follows.

```
int[] nums = {3, 6, 1, 0, 1, 4, 2};
```

What value will be returned as a result of the call `mystery(nums)` ?

- (A) 5
- (B) 6
- (C) 7
- (D) 10
- (E) 17

Questions 2-3 refer to the following information.

Consider the following partial class declaration.

```
public class SomeClass
{
    private int myA;
    private int myB;
    private int myC;

    // Constructor(s) not shown

    public int getA()
    { return myA; }

    public void setB(int value)
    { myB = value; }
}
```

2. The following declaration appears in another class.

```
SomeClass obj = new SomeClass();
```

Which of the following code segments will compile without error?

- (A) `int x = obj.getA();`
 - (B) `int x;`
`obj.getA(x);`
 - (C) `int x = obj.myA;`
 - (D) `int x = SomeClass.getA();`
 - (E) `int x = getA(obj);`
-

3. Which of the following changes to `SomeClass` will allow other classes to access but not modify the value of `myC` ?

- (A) Make `myC` public.
- (B) Include the method:
`public int getC()`
`{ return myC; }`
- (C) Include the method:
`private int getC()`
`{ return myC; }`
- (D) Include the method:
`public void getC(int x)`
`{ x = myC; }`
- (E) Include the method:
`private void getC(int x)`
`{ x = myC; }`

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4. Consider the following code segment.

```
int x = 7;
int y = 3;

if ((x < 10) && (y < 0))
    System.out.println("Value is: " + x * y);
else
    System.out.println("Value is: " + x / y);
```

What is printed as a result of executing the code segment?

- (A) Value is: 21
- (B) Value is: 2.3333333
- (C) Value is: 2
- (D) Value is: 0
- (E) Value is: 1

5. Consider the following method.

```
public ArrayList<Integer> mystery(int n)
{
    ArrayList<Integer> seq = new ArrayList<Integer>();

    for (int k = 1; k <= n; k++)
        seq.add(new Integer(k * k + 3));

    return seq;
}
```

Which of the following is printed as a result of executing the following statement?

```
System.out.println(mystery(6));
```

- (A) [3, 4, 7, 12, 19, 28]
- (B) [3, 4, 7, 12, 19, 28, 39]
- (C) [4, 7, 12, 19, 28, 39]
- (D) [39, 28, 19, 12, 7, 4]
- (E) [39, 28, 19, 12, 7, 4, 3]

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6. Consider the following method that is intended to determine if the `double` values `d1` and `d2` are close enough to be considered equal. For example, given a `tolerance` of `0.001`, the values `54.32271` and `54.32294` would be considered equal.

```
/** @return true if d1 and d2 are within the specified tolerance,  
 *     false otherwise  
 */  
public boolean almostEqual(double d1, double d2, double tolerance)  
{  
    /* missing code */  
}
```

Which of the following should replace `/* missing code */` so that `almostEqual` will work as intended?

- (A) `return (d1 - d2) <= tolerance;`
- (B) `return ((d1 + d2) / 2) <= tolerance;`
- (C) `return (d1 - d2) >= tolerance;`
- (D) `return ((d1 + d2) / 2) >= tolerance;`
- (E) `return Math.abs(d1 - d2) <= tolerance;`

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7. Consider the following class declaration.

```
public class Person
{
    private String myName;
    private int myYearOfBirth;

    public Person(String name, int yearOfBirth)
    {
        myName = name;
        myYearOfBirth = yearOfBirth;
    }

    public String getName()
    { return myName; }

    public void setName(String name)
    { myName = name; }

    // There may be instance variables, constructors, and methods that are not shown.
}
```

Assume that the following declaration has been made.

```
Person student = new Person("Thomas", 1995);
```

Which of the following statements is the most appropriate for changing the name of `student` from "Thomas" to "Tom" ?

- (A) `student = new Person("Tom", 1995);`
- (B) `student.myName = "Tom";`
- (C) `student.getName("Tom");`
- (D) `student.setName("Tom");`
- (E) `Person.setName("Tom");`

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8. Consider the following class declaration.

```
public class Student
{
    private String myName;
    private int myAge;

    public Student()
    { /* implementation not shown */ }

    public Student(String name, int age)
    { /* implementation not shown */ }

    // No other constructors
}
```

Which of the following declarations will compile without error?

- I. `Student a = new Student();`
 - II. `Student b = new Student("Juan", 15);`
 - III. `Student c = new Student("Juan", "15");`
- (A) I only
(B) II only
(C) I and II only
(D) I and III only
(E) I, II, and III

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9. Consider the following method that is intended to return the sum of the elements in the array `key`.

```
public static int sumArray(int[] key)
{
    int sum = 0;

    for (int i = 1; i <= key.length; i++)
    {
        /* missing code */
    }

    return sum;
}
```

Which of the following statements should be used to replace `/* missing code */` so that `sumArray` will work as intended?

- (A) `sum = key[i];`
- (B) `sum += key[i - 1];`
- (C) `sum += key[i];`
- (D) `sum += sum + key[i - 1];`
- (E) `sum += sum + key[i];`

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Questions 10-11 refer to the following information.

Consider the following instance variable and methods. You may assume that `data` has been initialized with `length > 0`. The methods are intended to return the index of an array element equal to `target`, or `-1` if no such element exists.

```
private int[] data;

public int seqSearchRec(int target)
{
    return seqSearchRecHelper(target, data.length - 1);
}

private int seqSearchRecHelper(int target, int last)
{
    // Line 1

    if (data[last] == target)
        return last;
    else
        return seqSearchRecHelper(target, last - 1);
}
```

10. For which of the following test cases will the call `seqSearchRec(5)` always result in an error?

- I. `data` contains only one element.
- II. `data` does not contain the value 5.
- III. `data` contains the value 5 multiple times.

- (A) I only
- (B) II only
- (C) III only
- (D) I and II only
- (E) I, II, and III

11. Which of the following should be used to replace `// Line 1` in `seqSearchRecHelper` so that `seqSearchRec` will work as intended?

- (A) `if (last <= 0)`
 `return -1;`
- (B) `if (last < 0)`
 `return -1;`
- (C) `if (last < data.length)`
 `return -1;`
- (D) `while (last < data.length)`
- (E) `while (last >= 0)`

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12. Consider the following method.

```
public String mystery(String input)
{
    String output = "";

    for (int k = 1; k < input.length(); k = k + 2)
    {
        output += input.substring(k, k + 1);
    }

    return output;
}
```

What is returned as a result of the call `mystery("computer")` ?

- (A) "computer"
- (B) "cmue"
- (C) "optr"
- (D) "ompute"
- (E) Nothing is returned because an `IndexOutOfBoundsException` is thrown.

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13. Consider the following code segment.

```
int[] arr = {7, 2, 5, 3, 0, 10};
for (int k = 0; k < arr.length - 1; k++)
{
    if (arr[k] > arr[k + 1])
        System.out.print(k + " " + arr[k] + " ");
}
```

What will be printed as a result of executing the code segment?

- (A) 0 2 2 3 3 0
- (B) 0 7 2 5 3 3
- (C) 0 7 2 5 5 10
- (D) 1 7 3 5 4 3
- (E) 7 2 5 3 3 0

14. Consider the following interface and class declarations.

```
public interface Vehicle
{
    /** @return the mileage traveled by this Vehicle
     */
    double getMileage();
}

public class Fleet
{
    private ArrayList<Vehicle> myVehicles;

    /** @return the mileage traveled by all vehicles in this Fleet
     */
    public double getTotalMileage()
    {
        double sum = 0.0;

        for (Vehicle v : myVehicles)
        {
            sum += /* expression */ ;
        }

        return sum;
    }

    // There may be instance variables, constructors, and methods that are not shown.
}
```

Which of the following can be used to replace `/* expression */` so that `getTotalMileage` returns the total of the miles traveled for all vehicles in the fleet?

- (A) `getMileage(v)`
- (B) `myVehicles[v].getMileage()`
- (C) `Vehicle.get(v).getMileage()`
- (D) `myVehicles.get(v).getMileage()`
- (E) `v.getMileage()`

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15. Consider the following method, `isSorted`, which is intended to return `true` if an array of integers is sorted in nondecreasing order and to return `false` otherwise.

```
/** @param data an array of integers
 *  @return true if the values in the array appear in sorted (nondecreasing) order
 */
public static boolean isSorted(int[] data)
{
    /* missing code */
}
```

Which of the following can be used to replace `/* missing code */` so that `isSorted` will work as intended?

- I.

```
for (int k = 1; k < data.length; k++)
{
    if (data[k - 1] > data[k])
        return false;
}
return true;
```
- II.

```
for (int k = 0; k < data.length; k++)
{
    if (data[k] > data[k + 1])
        return false;
}
return true;
```
- III.

```
for (int k = 0; k < data.length - 1; k++)
{
    if (data[k] > data[k + 1])
        return false;
    else
        return true;
}
return true;
```

- (A) I only
(B) II only
(C) III only
(D) I and II only
(E) I and III only

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16. Consider the following incomplete method that is intended to return an array that contains the contents of its first array parameter followed by the contents of its second array parameter.

```
public static int[] append(int[] a1, int[] a2)
{
    int[] result = new int[a1.length + a2.length];

    for (int j = 0; j < a1.length; j++)
        result[j] = a1[j];

    for (int k = 0; k < a2.length; k++)
        result[ /* index */ ] = a2[k];

    return result;
}
```

Which of the following expressions can be used to replace `/* index */` so that `append` will work as intended?

- (A) `j`
- (B) `k`
- (C) `k + a1.length - 1`
- (D) `k + a1.length`
- (E) `k + a1.length + 1`

17. Consider the following code segment.

```
int[] arr = {1, 2, 3, 4, 5, 6, 7};  
for (int k = 3; k < arr.length - 1; k++)  
    arr[k] = arr[k + 1];
```

Which of the following represents the contents of `arr` as a result of executing the code segment?

- (A) {1, 2, 3, 4, 5, 6, 7}
- (B) {1, 2, 3, 5, 6, 7}
- (C) {1, 2, 3, 5, 6, 7, 7}
- (D) {1, 2, 3, 5, 6, 7, 8}
- (E) {2, 3, 4, 5, 6, 7, 7}

18. Assume that `myList` is an `ArrayList` that has been correctly constructed and populated with objects. Which of the following expressions produces a valid random index for `myList` ?
- (A) `(int)(Math.random() * myList.size()) - 1`
 - (B) `(int)(Math.random() * myList.size())`
 - (C) `(int)(Math.random() * myList.size()) + 1`
 - (D) `(int)(Math.random() * (myList.size() + 1))`
 - (E) `Math.random(myList.size())`

19. Assume that `a` and `b` have been defined and initialized as `int` values. The expression

`!(!(a != b) && (b > 7))`

is equivalent to which of the following?

- (A) `(a != b) || (b < 7)`
- (B) `(a != b) || (b <= 7)`
- (C) `(a == b) || (b <= 7)`
- (D) `(a != b) && (b <= 7)`
- (E) `(a == b) && (b > 7)`

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20. Consider the following method.

```
public static void arrayMethod(int nums[])
{
    int j = 0;
    int k = nums.length - 1;

    while (j < k)
    {
        int x = nums[j];
        nums[j] = nums[k];
        nums[k] = x;
        j++;
        k--;
    }
}
```

Which of the following describes what the method `arrayMethod()` does to the array `nums`?

- (A) The array `nums` is unchanged.
- (B) The first value in `nums` is copied to every location in the array.
- (C) The last value in `nums` is copied to every location in the array.
- (D) The method generates an `ArrayIndexOutOfBoundsException`.
- (E) The contents of the array `nums` are reversed.