

AP Computer Science Midterm Review Part 2

1. Consider the following code segment.

```
int[ ] nums = new int[51];

for (int k = 0; k < nums.length; k++)
    nums[k] = 1;

for (int k = 3; k <= 50; k += 3)
    nums[k] = 0;

for (int k = 5; k <= 50; k += 5)
    nums[k] = 0;
```

How many elements in the array `nums` have the value 0 after this code has been executed?

- (A) 23
- (B) 25
- (C) 26
- (D) 27
- (E) 28

2. What are the contents of the array `nums` after the following code segment has been executed?

```
int[ ] nums = new int[8];
nums[0] = 0;
int n = 1;
while (n < nums.length)
{
    int k;
    for (k = n; k < 2*n; k++)
        nums[k] = nums[k - n] + 1;
    n = k;
}
```

- (A) 0 1 1 1 1 1 1 1
- (B) 0 1 0 1 0 1 0 1
- (C) 0 1 1 2 1 2 2 3
- (D) 0 1 2 3 1 2 3 4
- (E) 0 1 2 3 4 5 6 7

3. What is printed when the following code segment is executed?

```
String[ ] xy = {"X", "Y"};
String[ ] yx = xy;
yx[0] = xy[1];
yx[1] = xy[0];
System.out.println(xy[0] + xy[1] + yx[0] + yx[1]);
```

- (A) XXXX
- (B) XYYX
- (C) XYXY
- (D) XYYY
- (E) YYYX

4. Consider the following method.

```
private int swap(int a, int b)
{
    if (a < b)
    {
        b = a;
        a = b;
    }
    return b - a;
}
```

What are the values of the variables `a`, `b`, and `c` after the following statements are executed?

```
int a = 2, b = 5;
int c = swap(a, b);
```

- (A) 2, 5, 0
- (B) 2, 5, 3
- (C) 2, 5, -3
- (D) 2, 2, 0
- (E) 5 2 3

5. What is the output from

```
int n = 12;
System.out.print(goFigure(n));
System.out.print(" " + n);
```

Where the method `goFigure` is defined as follows:

```
public double goFigure(int n)
{
    n %= 7;
    return (double)(12 / n);
}
```

- (A) 2.0 12
- (B) 2.4 12
- (C) 2.0 5
- (D) 2.4 5
- (E) 2.4 6

6. Which of the following expressions will evaluate to `true` when `x` and `y` are boolean variables with different values?

- I. `(x || y) && (!x || !y)`
- II. `(x || y) && !(x && y)`
- III. `(x || !y) || (!x || y)`

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

7. What is the output from the following code segment?

```
double x = 5*4/2 - 5/2*4;  
System.out.println(x);
```

- (A) 0
- (B) 1
- (C) 0.0
- (D) 1.0
- (E) 2.0

8. What will array `arr` contain after the following code segment has been executed?

```
int[ ] arr = {4, 3, 2, 1, 0};  
for (int k = 1; k < arr.length; k++)  
{  
    arr[k - 1] += arr[k];  
}
```

- (A) 4, 7, 5, 3, 1
- (B) 4, 7, 9, 10, 10
- (C) 7, 5, 3, 1, 0
- (D) 7, 3, 2, 1, 0
- (E) 10, 6, 3, 1, 0

9. The code fragment

```
int x = < an integer value >;  
System.out.println(x*x);
```

displays -131071. Which of the following is a possible value of `x`?

- (A) -1
- (B) $2^{15} + 1$
- (C) $2^{16} - 1$
- (D) $2^{32} + 1$
- (E) No such value exists

10. Consider the following method.

```
public void change(double[ ] nums, int n)  
{  
    for (int k = 0; k < n; k++)  
    {  
        nums[k] = 5.4;  
    }  
    n = 2;  
}
```

What will be stored in `samples` and `len` after the following statements are executed?

```
double[ ] samples = {1.0, 2.1, 3.2, 4.3};  
int len = samples.length;  
change(samples, len);
```

- (A) `samples` contains 5.4, 5.4, 5.4, 5.4; `len` is 4
- (B) `samples` contains 5.4, 5.4, 5.4, 5.4; `len` is 2

- (C) samples contains 1.0, 2.1, 3.2, 4.3; len is 4
(D) samples contains 5.4, 5.4; len is 2
(E) samples contains 1.0, 2.1; len is 2

11. Given the declarations

```
int p = 5, q = 3;
```

which of the following expressions evaluate to 7.5?

- I. (double)p * (double)q / 2;
II. (double)p * (double)(q / 2);
III. (double)(p * q / 2);

- (A) I only
(B) II only
(C) I and II only
(D) I, II, and III
(E) None of them

12. Refer to the following declarations:

```
String [ ] colors = {"red", "green", "black"};  
List<String> colorList = new ArrayList<String> ( );
```

Which of the following correctly assigns the elements of the colors array to colorList? The final ordering of colors in colorList should be the same as in the colors array.

- I for (String col : colors)
 colorlist.add(col);

II for (String col: colorList)
 colors.add(col);

III for (int i = colors.length - 1; i >= 0; i--)
 colorList.add(i, colors[i]);

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

Questions 13 and 14 refer to the classes Address and Customer given below.

```
public class Address  
{  
    private String street;  
    private String city;  
    private String state;  
    private int zipCode;  
  
    public Address (String aStreet, String aCity, String aState, int aZipCode)  
    { /* implementation not shown */}  
  
    public String getCity()  
    { /* implementation not shown */}
```

```

    public String getState()
    { /* implementation not shown */}

    public int getZipCode()
    { /* implementation not shown */}

    //Other methods are not shown.
}

public class Customer
{
    private String name;
    private String phone;
    private Address address;
    private int ID;

    public Customer (String aName, String aPhone, Address anAddr, int anID)
    { /* implementation not shown */}

    public Address getAddress()
    { /* implementation not shown */}

    public String getName()
    { /* implementation not shown */}

    public String getPhone()
    { /* implementation not shown */}

    public int getID()
    { /* implementation not shown */}

    //Other methods are not shown.
}

```

13. Which of the following correctly creates a Customer object c?

- I Address a = new Address ("125 Bismark St", "Pleasantville", "NY", 14850);
 Customer c = new Customer ("Jack Spratt", "747-1674", a, 7008);
- II Customer c = new Customer("Jack Spratt", "747-1674", "125 Bismark St,
 Pleasantville, NY 14850", 7008);
- III Customer c = new Customer ("Jack Spratt", "747-1674", new Address ("125 Bismark
 St", "Pleasantville", "NY", 14850), 7008);

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

14. Consider an AllCustomers class that has private instance variable

```
private Customer[] custList;
```

Given the ID number of a particular customer, a method of the class, `locate`, must find the correct Customer record and return the name of that customer.
Here is the method `locate`:

```

/** Precondition: custList contains a complete list of Customer objects.
 *   @param idNum the ID number for a Customer
 *   @return the name of the customer with the specified idNum
 */
public String locate (int idNum)
{
    for (Customer c: custList)
        if (c.getID( ) == idNum)
            return c.getName( );
    return null;        //idNum not found
}

```

A more efficient algorithm for finding the matching Customer object could be used if

- (A) Customer objects were in alphabetical order by name.
- (B) Customer objects were sorted by phone number.
- (C) Customer objects were sorted by ID number.
- (D) the custList array had fewer elements.
- (E) the Customer class did not have an Address data member.

15. The following shuffling method is used to shuffle an array `arr` of `int` values. The method assumes the existence of a `swap` method, where `swap(arr, i, j)` interchanges the elements `arr[i]` and `arr[j]`.

```

public static void shuffle (int[] arr)
{
    for (int k = arr.length - 1; k > 0; k--)
    {
        int randIndex = (int) (Math.random( ) * (k+1));
        swap (arr, k, randIndex);
    }
}

```

Suppose the initial state of `arr` is 1 2 3 4 5, and when the method is executed the values generated for `randIndex` are 3, 2, 0, and 1, in that order. What will be the final state of `arr`?

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

16. A `Clock` class has hours, minutes, and seconds represented by `int` values. It also has each of the following methods: `setTime` to change the time on a `Clock` to the hour, minutes, and second specified; `getTime` to access the time; and `toString` to return the time as a `String`. The `Clock` class has a constructor that allows a `Clock` to be created with three `int` parameters for hours, minutes, and seconds. Consider a two-dimensional array of `Clock` values called `allClocks`. A code segment manipulating `allClocks` is as follows:

```

for (Clock[] row : allClocks)
    for (Clock c : row)
        /* morecode */

```

Assuming the `Clock` class works as specified, which replacement for `/* morecode */` will cause an error?

- I `System.out.print(c);`
- II `c.setTime(0, 0, 0);`
- III `c = new Clock(0, 0, 0);`

- (A) I only
- (B) II only

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

17. An algorithm for finding the average of N numbers is

$$average = \frac{sum}{N}$$

where N and sum are both integers. In a program using this algorithm, a programmer forgot to include a test that would check for N equal to zero. If N is zero, when will the error be detected?

- (A) At compile time
- (B) At edit time
- (C) As soon as the value of N is entered
- (D) During run time
- (E) When an incorrect result is output

18. This question is based on the following declarations:

```
String strA = "CARROT", strB = "Carrot", strC = "car";
```

Given that all uppercase letters precede all lowercase letters when considering alphabetical order, which is true?

- (A) `strA.compareTo(strB) < 0` && `strB.compareTo(strC) > 0`
- (B) `strC.compareTo(strB) < 0` && `strB.compareTo(strA) < 0`
- (C) `strB.compareTo(strC) < 0` && `strB.compareTo(strA) > 0`
- (D) `!(strA.compareTo(strB) == 0)` && `strB.compareTo(strA) < 0`
- (E) `!(strA.compareTo(strB) == 0)` && `strC.compareTo(strB) < 0`

19. Consider the following statement:

```
int num = /* expression */;
```

Which of the following replacements for `/* expression */` creates in `num` a random integer from 2 to 50, including 2 and 50?

- (A) `(int) (Math.random() * 50) - 2`
- (B) `(int) (Math.random() * 49) - 2`
- (C) `(int) (Math.random() * 49) + 2`
- (D) `(int) (Math.random() * 50) + 2`
- (E) `(int) (Math.random() * 48) + 2`

20. Consider the following code segment.

```
int num = 0, score = 10;
if (num != 0 && score / num > SOME_CONSTANT)
    statement1;
else
    statement2;
```

What is the result of executing this statement?

- (A) An `ArithmeticException` will be thrown.
- (B) A syntax error will occur.
- (C) **statement1**, but no **statement2**, will be executed.
- (D) **statement2**, but not **statement1**, will be executed.
- (E) Neither **statement1** nor **statement2** will be executed; control will pass to the first statement following the `if` statement.

21. Let `list` be an `ArrayList<String>` containing only these elements:

`"John", "Mary", "Harry", "Luis"`

Which of the following statements will cause an error to occur?

- I `list.set(2, "6");`
- II `list.add(4, "Pat");`
- III `String s = list.get(4);`

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

22. Which of the following code fragments will cause an error?

- a) `String greeting = "Hello, Dave!";`
- b) `String greeting = "Hello, World!";`
`int n = greeting.length();`
- c) `int luckyNumber = 7;`
`System.out.println(luckyNumber);`
- d) `PrintStream printer = System.out;`

23. What is the result of the following statement?

`String s = "You" + "had" + "me" + "at" + "hello";`

- a) The string `s` has the following value: `"You had me at hello"`
- b) The statement results in an error because the `+` operator can be used only with numbers
- c) The statement results in an error because the `+` operation cannot be performed on string literals
- d) The string `s` has the following value: `"Youhadmeathello"`

24. Assuming that the user inputs "Joe" at the prompt, what is the output of the following code snippet?

```
public static void main(String[] args)
{
    System.out.print("Enter your name ");
    String name;
    Scanner in = new Scanner(System.in);
    name = in.next();
    name += ", Good morning";
    System.out.print(name);
}
```

- a) The code snippet does not compile because the `+=` operator cannot be used in this context.
- b) Joe, Good morning
- c) , Good morning
- d) Joe

25. What happens to the fractional part when a division is performed on two integer variables?

- a) The fractional part is rounded off to the nearest integer value.
- b) The fractional part is discarded.
- c) Two integers cannot be used in division; at least one of the operands should be a floating-point number.
- d) Instead of using an integer division, you should use the modulus operator to perform floating-point division.

26. Which one of the following statements can be used to extract the last five characters from any string variable `str`?

- a) `str.substring(str.length() - 5, str.length())`
- b) `str.substring(5, 5)`
- c) `str.substring(str.length() - 4, 5)`
- d) `str.substring(str.length() - 5, 5)`

27. Consider the following code snippet:

```
ArrayList<Integer> arrList = new ArrayList<Integer>();
for (int i = 0; i < arrList.size(); i++)
{
    arrList.add(i + 3);
}
```

What value is stored in the element of the array list at index 0?

- a) 0
- b) 3
- c) 6
- d) None

28. Consider the following code snippet:

```
public static void main(String[] args)
{
    ArrayList<String> names = new ArrayList<String>();
    names.add("John");
    names.add("Jerry");
    names.add("Janet");
    ArrayList<String> names2 = reverse(names);
}

public static ArrayList<String> reverse(ArrayList<String> names)
{
    ArrayList<String> result = new ArrayList<String>();
    for (int i = names.size() - 1; i >= 0; i--)
    {
        result.add(names.get(i));
    }
    return <String>result;
}
```

Which statement is true after the `main` method is executed?

- a) `names` contains "Janet", "Jerry", "John" in this order
- b) `names` contains "John", "Jerry", "Janet" in this order
- c) `reverse` method has a bound error
- d) Compilation error due to the `return` statement in `reverse` method

29. What will be the output of the following code snippet?

```
int i;
int j;
for (i = 0; i < 7; i++)
{
    for (j = 7; j > i; j--)
    {
        System.out.print("*");
    }
}
```

```

    }
    System.out.println("");
}

```

- a) A rectangle with six rows and seven columns of asterisks. The number of rows increments by one on completion of one iteration of the inner loop.
- b) A right triangle with seven rows and seven columns of asterisks. The number of columns increments by one on completion of one iteration of the inner loop.
- c) A rectangle with seven rows and six columns of asterisks. The number of rows increments by one on completion of one iteration of the inner loop.
- d) A right triangle with seven rows and seven columns of asterisks. The number of columns decrements by one on completion of one iteration of the inner loop.

30. What is the output of this loop?

```

int i = 0;
boolean found;
while (i < 20 && !found)
{
    int sum = i * 2 + i * 3;
    System.out.print(sum + " ");
    if (sum > 50)
    {
        found = true;
    }
    i++;
}

```

- a) 0 5 10 15 20 25 30 35 40 45 50 55
- b) 0
- c) No output, compilation error
- d) 0 5 10

31. Insert a statement that will correctly terminate this loop when the end of input is reached.

```

boolean done = false;
while (!done)
{
    String input = in.next();
    if (input.equalsIgnoreCase("Q"))
    {
        _____
    }
    else
    {
        double x = Double.parseDouble(input);
        data.add(x);
    }
}

```

- a) stop;
- b) done = 1;
- c) exit;
- d) done = true;

32. Which code snippet produces the sum of the first n even numbers?

a)

```
int sum = 0;
for (int i = 1; i <= n; i++)
{
    if (i % 2 == 0)
    {
        sum = sum + i;
    }
}
```

b)

```
int sum = 0;
for (int i = 1; i <= n; i++)
{
    sum = sum + i * 2;
}
```

c)

```
int sum = 0;
for (int i = 0; i < n; i++)
{
    if (i % 2 == 0)
    {
        sum = sum + i;
    }
}
```

d)

```
int sum;
for (int i = 1; i <= n; i++)
{
    sum = sum + i * 2;
}
```

33. Choose the loop that is equivalent to this loop.

```
int n = 1;
double x = 0;
double s;
do
{
    s = 1.0 / (n * n);
    x = x + s;
    n++;
}
while (s > 0.01);
```

a)

```
double x = 0;
double s = 1;
for (int k = 1; s > 0.01; k++)
{
    s = 1.0 / (k * k);
    x = x + s;
}
```

b)

```
double x = 0;
```

```
double s = 1;
for (int k = 1; k < 100; k++)
{
    s = 1.0 / (k * k);
    x = x + s;
}
```

c)

```
double x = 0;
double s = 1;
int k = 10;
while (s > 0.01)
{
    s = 1.0 / (k * k);
    x = x + s;
    k++;
}
```

d)

```
double x = 0;
double s = 10;
int k = 1;
while (s > 0.01)
{
    s = 1.0 / (k * k);
    x = x + s;
    k++;
}
```

34. A company applies a discount based on the size of the order. If the order is over \$50, the discount is 5%. If the order is over \$100, the discount is 10%. Otherwise, there is no discount. If the integer variable order contains the size of the order, which of the following will assign the double variable discount the correct value?

- a.

```
if (order > 100)
    discount = 0.10;
else if (order > 50)
    discount = 0.05;
else
    discount = 0;
```
- b.

```
if (order > 100)
    discount = 0.10;
if (order > 50)
    discount = 0.05;
else
    discount = 0;
```
- c.

```
if (order > 100)
    discount = 0.10;
if (order > 50)
    discount = 0.05;
if (order <= 50)
    discount = 0;
```
- d.

```
if (order > 50)
    discount = 0.05;
else if (order > 100)
    discount = 0.10;
else
    discount = 0;
```

35. What is the output of the following code snippet?

```
int x = 25;
if (x < 100)
{
    x = x + 5;
}
if (x < 500)
{
    x = x - 2;
}
if (x > 10)
{
    x++;
}
else
{
    x--;
}
System.out.println(x);
```

- a) 27
- b) 28
- c) 29
- d) 30

36. What is the output of the following code snippet?

```
boolean passed = false;
String someStr = "Unknown";
passed = !(passed);
if (!passed)
{
    someStr = "False";
}
if (passed)
{
    passed = false;
}
if (!passed)
{
    someStr = "True";
}
else
{
    someStr = "Maybe";
}
System.out.println(someStr);
```

- a) False
- b) True
- c) Unknown
- d) Maybe

37. Which one of the following statements can be used to extract the last five characters from any string variable `str`?

- a) `str.substring(str.length() - 5, str.length())`
- b) `str.substring(5, 5)`
- c) `str.substring(str.length() - 4, 5)`
- d) `str.substring(str.length() - 5, 5)`

38. Assuming that the user inputs a value of 25000 for the pay and 10 for the bonus rate in the following code snippet, what is the output?

```
public static void main(String[] args)
{
    Scanner in = new Scanner(System.in);
    System.out.print("Enter the pay: ");
    double pay = in.nextDouble();
    System.out.print("Enter the bonus rate: ");
    double bonus = in.nextDouble();

    System.out.println("The new pay is " +
        (pay + pay * (bonus / 100.0)));
}
```

- a) The new pay is 25000
- b) The new pay is 25100
- c) The new pay is 27500
- d) The new pay is 30000

39. Which one of the following statements displays the output as +000321.00?

- a) `System.out.printf("+%09.2f", 321.0);`
- b) `System.out.printf("%009,2f", 321.0);`
- c) `System.out.printf("+9.2f", 321.0);`
- d) `System.out.printf("%09.00f", 321.0);`

40. Which statement is true?

- a) Variables cannot be assigned and declared in the same statement
- b) Variable names must contain at least one dollar sign
- c) Variable names can be no more than 8 characters long
- d) It is incorrect to initialize a string variable with a number

AP Computer Science Midterm Review Part 2 Answer Key

1	A
2	C
3	E
4	A
5	A
6	E
7	E
8	C
9	C
10	A

11	A
12	A
13	E
14	C
15	A
16	C
17	D
18	C
19	C
20	D

21	C
22	B
23	D
24	B
25	B
26	A
27	D
28	D
29	D
30	C

31	D
32	B
33	A
34	A
35	C
36	B
37	A
38	C
39	A
40	D