AP Computer Science
Chapter 5 Review

1. Multiple-Choice Questions

1) The idea that program instructions execute in order (linearly) unless otherwise specified through a conditional statement is known as
A) boolean execution
B) conditional statements
C) try and catch
D) sequentiality
E) flow of control

Answer: E

2) Of the following if statements, which one correctly executes three instructions if the condition is true?
A)
```
if (x < 0)
  a = b * 2;
  y = x;
  z = a - y;
```
B)
```
    {
if (x < 0)
  a = b * 2;
  y = x;
  z = a - y;
}
```
C)
```
if { (x < 0)
  a = b * 2;
  y = x;
  z = a - y ;
}
```
D)
```
if (x < 0)
{
a = b * 2;
y = x;
z = a - y;
}
```
E) B, C and D are all correct, but not A

Answer: D

3) Which of the sets of statements below will add 1 to x if x is positive and subtract 1 from x if x is negative but leave x alone if x is 0?
A)
```
if (x > 0) x++;
else x--;
```
B)
```
if (x > 0) x++;
else if (x < 0) x--;
```
C)
```
if (x > 0) x++;
if (x < 0) x--;
else x = 0;
```
D)
```
if (x == 0) x = 0;
else x++;
x--;
```

E)
```
x++;
x--;
```

Answer: B

Given the nested if-else structure below, answer questions #4 ~ 6 below.

```
if (a > 0)
   if (b < 0)
      x = x + 5;
   else
      if (a > 5)
         x = x + 4;
      else
         x = x + 3;
else
   x = x + 2;
```

4) If x is currently 0, a = 5 and b = 5, what will x become after the above statement is executed?
A) 0
B) 2
C) 3
D) 4
E) 5

Answer: C

5) If x is currently 0, a = 0 and b = -5, what will x become after the above statement is executed?
A) 0
B) 2
C) 3
D) 4
E) 5

Answer: B

6) If x is currently 0, a = 1 and b = -1, what will x become after the above statement is executed?
A) 0
B) 2
C) 3
D) 4
E) 5
Answer: E

7) Consider the following code that will assign a letter grade of 'A', 'B', 'C', 'D', or 'F' depending on a student's test score.

```
if (score >= 90) grade = 'A';
if (score >= 80) grade = 'B';
if (score >= 70) grade = 'C';
if (score >= 60) grade = 'D';
else grade = 'F';
```

A) This code will work correctly in all cases
B) This code will work correctly only if grade >= 60
C) This code will work correctly only if grade < 60

D) This code will work correctly only if grade < 70
E) This code will not work correctly under any circumstances

Answer: D

8) Assume that count is 0, total is 20 and max is 1. The following statement will do which of the following?

```
if (count != 0 && total / count > max)  max = total / count;
```

A) The condition short circuits and the assignment statement is not executed
B) The condition short circuits and the assignment statement is executed without problem
C) The condition does not short circuit causing a division by zero error
D) The condition short circuits so that there is no division by zero error when evaluating the condition, but the assignment statement causes a division by zero error
E) The condition will not compile because it uses improper syntax

Answer: A

9) What is wrong, logically, with the following code?

```
if (x > 10) System.out.println("Large");
else if (x > 6 && x <= 10) System.out.println("Medium");
else if (x > 3 && x <= 6) System.out.println("Small");
else System.out.println("Very small");
```

A) There is no logical error, but there is no need to have (x <= 10) in the second conditional or (x <= 6) in the third conditional
B) There is no logical error, but there is no need to have (x > 6) in the second conditional or (x > 3) in the third conditional
C) The logical error is that no matter what value x is, "Very small" is always printed out
D) The logical error is that no matter what value x is, "Large" is always printed out
E) There is nothing wrong with the logic at all

Answer: A

10) Consider the following outline of a nested if-else structure which has more if clauses than else clauses. Which of the statements below is true regarding this structure?

```
if (condition1)
   if (condition2)
        statement1;
else  statement2;
```

A) syntactically it is invalid to have more if clauses than else clauses
B) statement2 will only execute if condition1 is false and condition2 is false
C) statement2 will only execute if condition1 is true and condition2 is false
D) statement2 will only execute if condition1 is false, it does not matter what condition2 is
E) statement2 will never execute

Answer: B

11) Assume that x and y are int variables with x = 5, y = 3, and a and d are char variables with a = 'a' and d = 'A', and examine the following conditions:

Condition 1: `(x < y && x > 0)`
Condition 2: `(a != d || x != 5)`
Condition 3: `!(true && false)`
Condition 4: `(x > y || a == 'A' || d != 'A')`

A) All 4 Conditions are true
B) Only Condition 2 is true
C) Condition 2 and Condition 4 are true only
D) Conditions 2, 3 and 4 are all true, Condition 1 is not
E) All 4 Conditions are false

Answer: D

12) The break statement does which of the following?
A) ends the program
B) transfers control out of the current control structure such as a loop or switch statement
C) ends the current line of output, returning the cursor
D) denotes the ending of a switch statement
E) indicates the end of line when using System.out.print

Answer: B

13) If a break occurs within the innermost loop of a nested loop that is three levels deep
A) when the break is encountered just the innermost loop is "broken"
B) when the break is encountered, all loops are "broken" and execution continues from after the while statement (in our example)
C) when the break is encountered, all but the outermost loops are broken, and execution continues from the next iteration of the while loop (in our example)
D) this is a syntax error unless there are break or continue statements at each loop level
E) none of the above

Answer: A

14) Every Interator
A) has a hasNext( ) method
B) has a hasFirst( ) method
C) has a hasNextInt( ) method
D) has a isEmpty( ) method
E) none of the above

Answer: A

15) If x is an int where x = 1, what will x be after the following loop terminates?

```
while (x < 100)
   x *= 2;
```

A) 2
B) 64
C) 100
D) 128
E) none of the above, this is an infinite loop
Answer: D

16) If x is an int where x = 0, what will x be after the following loop terminates?

```
while (x < 100)
   x *= 2;
```

A) 2
B) 64
C) 100
D) 128
E) none of the above, this is an infinite loop

Answer: E

17) How many times will the following loop iterate?

```
int x = 10;
while (x > 0)
{
      System.out.println(x);
      x--;
}
```

A) 0 times
B) 1 time
C) 9 times
D) 10 times
E) 11 times

Answer: D

18) Which of the following are true statements about check boxes?
A) they may be checked or unchecked
B) radio buttons are a special kind of check boxes
C) they are Java components
D) you can control whether or not they will be visible
E) all of the above

Answer: E

19) As introduced in the Software Failure, the terminology "risk analysis" means
A) how willing are you to risk the loss of several key programmers working on your project
B) how much are you willing to risk that a particular piece of software you are developing still contains an error or errors
C) how willing are you to risk that your software will fail once implemented
D) how willing are you to risk that the machines on which your software will run will not work
E) none of the above

Answer: B

20) The following code snippet contains an error. What is the error?

```
if (cost > 100);
{
   cost = cost - 10;
}
System.out.println("Discount cost: " + cost);
```

A) Syntax error (won't compile)
B) Logical error: use of an uninitialized variable
C) Logical error: `if` statement has do-nothing statement after if condition
D) Logical error: assignment statement does not show equality
E) Both B) and D)

Answer: C

21) What can be done to improve the following code fragment?

```
if ((counter % 10) == 0)
{
   System.out.println("Counter is divisible by ten: " + counter);
   counter++;
}
else
{
   System.out.println("Counter is not divisible by ten: "
      + counter);
   counter++;
}
```

A) Move the duplicated code outside of the `if` statement
B) Shorten variable names
C) Move the brackets to save several lines of code
D) Add semicolons after the if condition and the else reserved word
E) Nothing need to be done.

Answer: A

22) Assuming that a user enters 25 as the value for `x`, what is the output of the following code snippet?

```
int x;
Scanner in = new Scanner(System.in);
System.out.print("Enter a number: ");
x = in.nextInt();
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
E) 31

Answer: C

23) Which of the following statements is (are) true about an `if` statement?

I. It guarantees that several statements are always executed in a specified order.
II. It repeats a set of statements as long as the condition is true.
III. It allows the program to carry out different actions depending on the value of a condition.

A) I
B) II
C) III
D) I, II, III
E) II and III

Answer: C

24) Suppose one needs an `if` statement to check whether an integer variable `pitch` is equal to 440 (which is the frequency of the note "A" to which strings and orchestras tune). Which condition is correct?

A) `if (pitch - 440 = 0)`
B) `if ((pitch !< 440) && (pitch !> 440))`
C) `if (pitch = 440)`
D) `if (pitch == 440)`
E) `if (pitch.equals(440))`

Answer: D

25) Consider the following code snippet. What is the output?

```
double average;
average = (g1 + g2 + g3 + g4) / 4.0;
if (average == 90.0)
{
   System.out.println("You earned an A in the class!");
}
```

A) Using == to test the `double` variable `average` for equality is error-prone.
B) The conditional will not evaluate to a Boolean value.
C) The assignment operator should not be used within an if-statement conditional.
D) Literals should never be used in `if` statement conditionals.
E) No output.

Answer: E

26) What is the output of the code snippet given below?

```
int i = 0;
while (i != 9)
{
   System.out.println("" + i);
   i = i + 2;
}
```

A) No output
B) 0 2 4 6 8
C) 10 12 14 16 18 …. (infinite loop)
D) 0 2 4 6 8 10 12 14 …. (infinite loop)
E) 1 3 5 7 9 11 13 …. (infinite loop)

Answer: D

27) What is the output of the following code snippet?

```
int i = 1;
while (i < 10)
{
   System.out.print(i + " ");
   i = i + 2;
   if (i == 5)
   {
      i = 9;
   }
}
```

a) 1 3 5
b) 1 3 9
c) 1 3 5 7
d) 1 3 5 7 9
E) 1 3 5 9

Answer: B

28) How many times does the following code fragment display "Hi"?

```
int i = 10;
while (i >= 0)
{
   System.out.println("Hi");
   i--;
}
```

A) 9 times
B) 10 times
C) 11 times
D) 12 times
E) Infinite while loop

Answer: C

29) What is the output of the code snippet given below?

```
String s = "12345";
int i = 1;
while (i < 5)
{
   System.out.print(s.substring(i, i + 1));
   i++;
}
```

A) No output
B) 1234
C) 12345
D) 2345
E) 1234

Answer: D

30) What is the value of the `count` variable after the execution of the given code snippet?

```
ArrayList<Integer> num = new ArrayList<Integer>();
num.add(1);
num.add(2);
num.add(3);
int count = 0;
int i = 0;
while (i < num.size())
{
   if (num.get(i) % 2 == 0)
   {
      count++;
   }
   i++;
}
```

A) 1
B) 2
C) 0
D) 3
E) No output

Answer: A

2. True/False Questions

1) As in the other members of the C family of languages (C, C++, C#), Java interprets a zero value as false and a non-zero value as true.

Answer: FALSE

2) In Java, selection statements consist of the if and if-else statements.

Answer: FALSE

3) In Java, the symbol "=" and the symbol "==" are used synonymously (interchangeably).

Answer: FALSE

4) When comparing any primitive type of variable, == should always be used to test to see if two values are equal.

Answer: FALSE

5) The statement { } is a legal block.

Answer: TRUE

6) The statement if (a >= b) a++; else b--; will do the same thing as the statement if (a < b) b--; else a++;.

Answer: TRUE

7) An if statement may or may not have an else clause, but an else clause must be part of an if statement.

Answer: TRUE

8) In order to compare int, float and double variables, you can use <, >, ==, !=, <=, >=, but to compare char and String variables, you must use compareTo( ), equals( ) and equalsIgnoreCase( ).

Answer: FALSE

For the questions below, assume that `boolean done = false, int x = 10, int y = 11, String s = "Help" and String t = "Goodbye".`

9) The expression (!done && x <= y) is true.

Answer: TRUE

10) The expression (s.concat(t).length( ) < y) is true.

Answer: FALSE

11) An array list value can be modified inside the method.

Answer: TRUE

3. Free-Form/Short Answer Questions

1) Rewrite the following set of if statements using a nested if-else structure.

```
if (score >= 90) grade = 'A';
if (score >= 80 && score < 90) grade = 'B';
if (score >= 70 && score < 80) grade = 'C';
if (score >= 60 && score < 70) grade = 'D';
if (score < 60) grade = 'F';
```

Answer:

```
if (score >= 90) grade = 'A';
else if (score >= 80) grade = 'B';
else if (score >= 70) grade = 'C';
else if (score >= 60) grade = 'D';
else grade = 'F';
```

2) Explain what is meant by short circuiting and provide an example of short circuiting a condition with && and provide an example of short circuiting a condition with | |.

Answer: Short circuiting is when a boolean expression does not have to be completely evaluated because the final answer is determined with just a partial evaluation. This can occur in an expression with && if one part of the expression evaluates to false, and in an expression with | | if one part of the expression evaluates to true.

3) The following code has a syntax error immediately before the word else. What is the error and why does it arise? Fix the code so that this statement is a legal if-else statement.

```
if (x < 0) ;
   x++;
else x--;
```

Answer: The error is "else without if" and it arises because of the ";" after the condition but before x++. The Java compiler determines that the if clause is in fact ; (no statement) and that x++; is a statement that follows the if statement. Therefore, since x++; is not part of the if statement, the "else" is felt to be an else without an if, and that is why the error has arise. The statement should be

```
if (x < 0)
   x++;
else x--;
```

4) String s1 is said to overlap String s2 if all of the characters in s1 also appear in s2. Write a set of code that will set the boolean variable overlap to true if s1 overlaps s2 and false otherwise. Assume both s1 and s2 have already been input.

Answer:
```
boolean overlap = true;    // assume the two Strings will overlap
int j = 0;
while (overlap && j < s1.length( ))
{
      boolean found = false;      // search in s2 for character at position j in s1
      int k = 0;
      while (!found && k < s2.length( ))     // if found, set found to true
         if (s2.charAt(k) == s1.charAt(j))
            found = true;
         else k++;           // otherwise go on to next character in s2
      if (!found) overlap = false;     // if a full pass is made through s2 and a
character not
      j++;                        // found then set overlaps to false, otherwise
continue
}
```

5) Consider the following code snippet:

```
ArrayList<Integer> num1 = new ArrayList<Integer>();
int data;
Scanner in = new Scanner(System.in);
int i = 0;
while(i < 5)
{
   data = in.nextInt();
   num1.add(data);
   if (data == 0 && num1.size() > 3)
```

```
    {
       num1.remove(num1.size() - 1);
    }
    i++;
}
System.out.println("size is : " + num1.size());
```

Write down the output of the given code snippet if the user enters 1,2,0,0,1 as the input?

Answer: The output is "size is : 4".