Unit 4: Iteration (Part A) MCQ

1. Consider the following method.

```
/** Precondition: arr contains only positive values.
 */
public static void doSome(int[] arr, int lim)
{
  int v = 0;
  int k = 0;
  while (k < arr.length && arr[k] < lim)
  {
    if (arr[k] > v)
    {
      v = arr[k]; /* Statement S */
    }
    k++; /* Statement T */
  }
}
```

Assume that doSome is called and executes without error. Which of the following are possible combinations for the value of lim, the number of times *Statement* S is executed, and the number of times *Statement* T is executed?

	Value of `lim`	Executions of *Statement S*	Executions of *Statement T*
I.	5	0	5
II.	7	4	9
III.	3	5	2

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

Unit 4: Iteration (Part A) MCQ

2. Consider the following two code segments. Assume that the `int` variables `m` and `n` have been properly declared and initialized and are both greater than `0`.

I.
```
for (int i = 0; i < m * n; i++)
{
   System.out.print("A");
}
```

II.
```
for (int j = 1; j <= m; j++)
{
   for (int k = 1; k < n; k++)
   {
      System.out.print("B");
   }
}
```

Assume that the initial values of `m` and `n` are the same in code segment I as they are in code segment II. Which of the following correctly compares the number of times that `"A"` and `"B"` are printed when each code segment is executed?

(A) `"A"` is printed `m` fewer times than `"B"`.

(B) `"A"` is printed `n` fewer times than `"B"`.

(C) `"A"` is printed `m` more times than `"B"`.

(D) `"A"` is printed `n` more times than `"B"`.

(E) `"A"` and `"B"` are printed the same number of times.

3. 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?

Unit 4: Iteration (Part A) MCQ

(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.

4. Consider the following code segment.

```
int j = 1;
while (j < 5)
{
     int k = 1;
     while (k < 5)
     {
          System.out.println(k);
          k++;
     }
     j++;
}
```

Which of the following best explains the effect, if any, of changing the first line of code to `int j = 0;` ?

(A) There will be one more value printed because the outer loop will iterate one additional time.
(B) There will be four more values printed because the outer loop will iterate one additional time.
(C) There will be one less value printed because the outer loop will iterate one fewer time.
(D) There will be four fewer values printed because the outer loop will iterate one fewer time.
(E) There will be no change to the output of the code segment.

5. Consider the following method definition. The method `printAllCharacters` is intended to print out every character in `str`, starting with the character at index `0`.

```
public static void printAllCharacters(String str)
{
     for (int x = 0; x < str.length(); x++)   // Line 3
     {
          System.out.print(str.substring(x, x + 1));
     }
}
```

The following statement is found in the same class as the `printAllCharacters` method.

```
printAllCharacters("ABCDEFG");
```

Which choice best describes the difference, if any, in the behavior of this statement that will result from changing `x < str.length()` to `x <= str.length()` in line 3 of the method?

Unit 4: Iteration (Part A) MCQ

(A) The method call will print fewer characters than it did before the change because the loop will iterate fewer times.

(B) The method call will print more characters than it did before the change because the loop will iterate more times.

(C) The method call, which worked correctly before the change, will now cause a run-time error because it attempts to access a character at index `7` in a string whose last element is at index `6`.

(D) The method call, which worked correctly before the change, will now cause a run-time error because it attempts to access a character at index `8` in a string whose last element is at index `7`.

(E) The behavior of the code segment will remain unchanged.

6. Consider the following method.

```
/** Precondition: bound >= 0 */
public int sum(int bound)
{
     int answer = 0;
     for (int i = 0; i < bound; i++)
     {
         answer += bound;
     }
     return answer;
}
```

Assume that `sum` is called with a parameter that satisfies the precondition and that it executes without error. How many times is the test expression `i < bound` in the `for` loop header evaluated?

(A) `0`

(B) `bound - 1`

(C) `bound`

(D) `bound + 1`

(E) An unknown number of times

7. Which of the following code segments produces the output `"987654321"` ?

Unit 4: Iteration (Part A) MCQ

(A)
```
int num = 10;
while (num > 0)
{
     System.out.print(num);
     num--;
}
```

(B)
```
int num = 10;
while (num >= 0)
{
     System.out.print(num);
     num--;
}
```

(C)
```
int num = 10;
while (num > 1)
{
     num--;
     System.out.print(num);
}
```

(D)
```
int num = 10;
while (num >= 1)
{
     num--;
     System.out.print(num);
}
```

(E)
```
int num = 0;
while (num <= 9)
{
     System.out.print(10 - num);
     num++;
}
```

Unit 4: Iteration (Part A) MCQ

8. Consider the following method.

```
/** Precondition: Strings one and two have the same length. */
public static String combine(String one, String two)
{
     String res = "";
     for (int k = 0; k < one.length(); k++)
     {
         if (one.substring(k, k + 1).equals(two.substring(k, k + 1)))
         {
            res += one.substring(k, k + 1);
         }
         else
         {
            res += "0";
         }
     }
     return res;
}
```

What is returned as a result of the call `combine("10110", "01100")` ?

(A) `"00000"`

(B) `"00100"`

(C) `"00101"`

(D) `"10110"`

(E) `"11011"`

Unit 4: Iteration (Part A) MCQ

9. Consider the following methods.

```
/** Precondition: a > 0 and b > 0 */
public static int methodOne(int a, int b)
{
     int loopCount = 0;
     for (int i = 0; i < a / b; i++)
     {
         loopCount++;
     }
     return loopCount;
}
/** Precondition: a > 0 and b > 0 */
public static int methodTwo(int a, int b)
{
     int loopCount = 0;
     int i = 0;
     while (i < a)
     {
         loopCount++;
         i += b;
     }
     return loopCount;
}
```

Which of the following best describes the conditions under which `methodOne` and `methodTwo` return the same value?

(A) When `a` and `b` are both even

(B) When `a` and `b` are both odd

(C) When `a` is even and `b` is odd

(D) When `a % b` is equal to zero

(E) When `a % b` is equal to one

Unit 4: Iteration (Part A) MCQ

10. Consider the following code segments. Code segment 2 is a revision of code segment 1 in which the loop increment has been changed.

Code Segment 1

```
int sum = 0;
for (int k = 1; k <= 30; k++)
{
     sum += k;
}
System.out.println("The sum is: " + sum);
```

Code Segment 2

```
int sum = 0;
for (int k = 1; k <= 30; k = k + 2)
{
     sum += k;
}
System.out.println("The sum is: " + sum);
```

Code segment 1 prints the sum of the integers from 1 through 30, inclusive. Which of the following best explains how the output changes from code segment 1 to code segment 2 ?

(A) Code segment 1 and code segment 2 will produce the same output.

(B) Code segment 2 will print the sum of only the even integers from 1 through 30, inclusive because it starts `sum` at zero, increments `k` by twos, and terminates when `k` exceeds `30`.

(C) Code segment 2 will print the sum of only the odd integers from 1 through 30, inclusive because it starts `k` at one, increments `k` by twos, and terminates when `k` exceeds `30`.

(D) Code segment 2 will print the sum of only the even integers from 1 through 60, inclusive because it starts `sum` at zero, increments `k` by twos, and iterates 30 times.

(E) Code segment 2 will print the sum of only the odd integers from 1 through 60, inclusive because it starts `k` at one, increments `k` by twos, and iterates 30 times.

11. Consider the following method.

```
public int compute(int n, int k)
{
  int answer = 1;

  for (int i = 1; i <= k; i++)
    answer *= n;

  return answer;
}
```

Which of the following represents the value returned as a result of the call compute (n, k) ?

Unit 4: Iteration (Part A) MCQ

(A) n*k
(B) n!
(C) n^k
(D) 2^k
(E) k^n

12. Consider the following code segment. The code is intended to read nonnegative numbers and compute their product until a negative number is read; however, it does not work as intended. (Assume that the readInt method correctly reads the next number from the input stream.)

```
int k = 0;

int prod = 1;


while (k >= 0)

{

  System.out.print("enter a number: ");

  k = readInt(); // readInt reads the next number from input

  prod = prod * k;

}


System.out.println("product: " + prod);
```

Which of the following best describes the error in the program?

(A) The variable prod is incorrectly initialized.
(B) The while condition always evaluates to false.
(C) The while condition always evaluates to true.
(D) The negative number entered to signal no more input is included in the product.
(E) If the user enters a zero, the computation of the product will be terminated prematurely.

Unit 4: Iteration (Part A) MCQ

13. Consider the following code segment.

```
int x = 1;
while ( /* missing code */ )
{
  System.out.print(x + " ");
  x = x + 2;
}
```

Consider the following possible replacements for /* missing code */.

I. x < 6

II. x != 6

III. x < 7

Which of the proposed replacements for /* missing code */ will cause the code segment to print only the values 1 3 5?

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

Unit 4: Iteration (Part A) MCQ

14. Consider the following code segment.

```
int x = 1;
while ( /* condition */ )
{
  if (x % 2 == 0)
  {
    System.out.print(x + " ");
  }
  x = x + 2;
}
```

The following conditions have been proposed to replace /* *condition* */ in the code segment.

I. x < 0

II. x <= 1

III. x < 10

For which of the conditions will nothing be printed?

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

15. Consider the following code segment.

```
for (int k = 0; k < 20; k = k + 2)
{
  if (k % 3 == 1)
  {
    System.out.print(k + "  ");
  }
}
```

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

Unit 4: Iteration (Part A) MCQ

(A) 4 16
(B) 4 10 16
(C) 0 6 12 18
(D) 1 4 7 10 13 16 19
(E) 0 2 4 6 8 10 12 14 16 18

16. Consider the following code segment.

```
for (int r = 3; r > 0; r--)
{
  int c;

  for (c = 1; c < r; c++)
  {
    System.out.print("-");
  }
  for (c = r ; c <= 3; c++)
  {
    System.out.print("*");
  }

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

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

(A)
```
--*
-**
***
```

(B)
```
*--
**-
***
```

(C)
```
***
-**
--*
```

(D)
```
***
**-
*--
```

(E)
```
--*
***
--*
```

Unit 4: Iteration (Part A) MCQ

17. Consider the following code segment.

```
int sum = 0;
int k = 1;
while (sum < 12 || k < 4)
  sum += k;

System.out.println(sum);
```

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

(A) 6
(B) 10
(C) 12
(D) 15
(E) Nothing is printed due to an infinite loop.

18. Consider the following code segment.

```
int num = 2574;
int result = 0;

while (num > 0)
{
  result = result * 10 + num % 10;
  num /= 10;
}
System.out.println(result);
```

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

(A) 2
(B) 4
(C) 18
(D) 2574
(E) 4752

Unit 4: Iteration (Part A) MCQ

19. Consider the following code segment.

```
int count = 0;

for (int x = 0; x < 4; x++)
{
  for (int y = x; y < 4; y++)
  {
    count++;
  }
}
System.out.println(count);
```

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

(A) 4

(B) 8

(C) 10

(D) 16

(E) 20

20. Consider the following code segment.

```
for (int k = 1; k <= 100; k++)
  if ((k % 4) == 0)
    System.out.println(k);
```

Which of the following code segments will produce the same output as the code segment above?

(A)
```
for (int k = 1; k <= 25; k++)
  System.out.println(k);
```

(B)
```
for (int k = 1; k <= 100; k = k + 4)
  System.out.println(k);
```

(C)
```
for (int k = 1; k <= 100; k++)
  System.out.println(k % 4);
```

(D)
```
for (int k = 4; k <= 25; k = 4 * k)
  System.out.println(k);
```

(E)
```
for (int k = 4; k <= 100; k = k + 4)
  System.out.println(k);
```

Unit 4: Iteration (Part A) MCQ

21. Consider the following code segment.

```
for (int outer = 1; outer <= 6; outer++)
{
  for (int inner = outer; inner <= 6; inner++)
  {
    if (inner % 2 == 0)
    {
      System.out.print(inner + "  ");
    }
  }
  System.out.println();
}
```

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

(A)
```
2  4  6
4  6
6
```

(B)
```
2  4  6
2  4  6
2  4  6
```

(C)
```
2  4  6
2  4  6
4  6
4  6
6
6
```

(D)
```
2  4  6
2  4  6
2  4  6
2  4  6
2  4  6
2  4  6
```

(E)
```
2  4
2  4
4
4
```

Unit 4: Iteration (Part A) MCQ

22. Consider the following incomplete method, which is intended to return the number of integers that evenly divide the integer inputVal. Assume that inputVal is greater than 0.

```
public static int numDivisors(int inputVal)
{
  int count = 0;
  for (int k = 1; k <= inputVal; k++)
  {
    if ( /* condition */ )
    {
      count++;
    }
  }
  return count;
}
```

Which of the following can be used to replace / * *condition* * / so that numDivisors will work as intended?

(A) inputVal % k == 0

(B) k % inputVal == 0

(C) inputVal % k != 0

(D) inputVal / k == 0

(E) k / inputVal > 0

Unit 4: Iteration (Part A) MCQ

23. Consider the following method.

```
public int getTheResult(int n)

{

int product = 1;

for (int number = 1; number < n; number++)

{

if (number % 2 == 0)

product *= number;

}

return product;

}
```

What value is returned as a result of the call getTheResult(8) ?

(A) 48
(B) 105
(C) 384
(D) 5040
(E) 40320

Unit 4: Iteration (Part A) MCQ

24. Consider the following method.

```
public int mystery(int num)

{

int x = num;

while (x > 0)

{

if (x / 10 % 2 == 0)

return x;

x = x / 10;

}

return x;

}
```

What value is returned as a result of the call mystery(1034) ?

(A) 4
(B) 10
(C) 34
(D) 103
(E) 1034

Unit 4: Iteration (Part A) MCQ

25. 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.

26. Consider the following method.

```
public static boolean mystery(String str)
{
  String temp = "";

  for (int k = str.length(); k > 0; k--)
  {
    temp = temp + str.substring(k - 1, k);
  }

  return temp.equals(str);
}
```

Which of the following calls to mystery will return true?

(A) mystery ("no")

(B) mystery ("on")

(C) mystery ("nnoo")

(D) mystery ("nono")

(E) mystery ("noon")

Unit 4: Iteration (Part A) MCQ

27. Consider the following method.

```
//* Precondition: num > 0 */
public static int doWhat(int num)
{
  int var = 0;

  for (int loop = 1; loop <= num; loop = loop + 2)
  {
    var += loop;
  }

  return var;
}
```

Which of the following best describes the value returned from a call to doWhat ?

(A) num

(B) The sum of all integers between 1 and num, inclusive

(C) The sum of all even integers between 1 and num, inclusive

(D) The sum of all odd integers between 1 and num, inclusive

(E) No value is returned because of an infinite loop.

28. Consider the following output.

```
1  1  1  1  1
2  2  2  2
3  3  3
4  4
5
```

Which of the following code segments will produce this output?

Unit 4: Iteration (Part A) MCQ

(A)

```
for (int j = 1; j <= 5; j++)
{
  for (int k = 1; k <= 5; k++)
  {
    System.out.print(j + "  ");
  }
  System.out.println();
}
```

(B)

```
for (int j = 1; j <= 5; j++)
{
  for (int k = 1; k <= j; k++)
  {
    System.out.print(j + "  ");
  }
  System.out.println();
}
```

(C)

```
for (int j = 1; j <= 5; j++)
{
  for (int k = 5; k >= 1; k--)
  {
    System.out.print(j + "  ");
  }
  System.out.println();
}
```

(D)

```
for (int j = 1; j <= 5; j++)
{
  for (int k = 5; k >= j; k--)
  {
    System.out.print(j + "  ");
  }
  System.out.println();
}
```

(E)

```
for (int j = 1; j <= 5; j++)
{
  for (int k = j; k <= 5; k++)
  {
    System.out.print(k + "  ");
  }
  System.out.println();
}
```

Unit 4: Iteration (Part A) MCQ

29. Consider the following method, which is intended to count the number of times the letter `"A"` appears in the string `str`.

```
public static int countA(String str)
{
     int count = 0;

     while (str.length() > 0)
     {
         int pos = str.indexOf("A");
         if (pos >= 0)
         {
            count++;
            /* missing code */
         }
         else
         {
            return count;
         }
     }
     return count;
}
```

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

(A) `str = str.substring(0, pos);`

(B) `str = str.substring(0, pos + 1);`

(C) `str = str.substring(pos - 1);`

(D) `str = str.substring(pos);`

(E) `str = str.substring(pos + 1);`

30. Consider the following code segment.

```
int num = 1;
int count = 0;
while (num <= 10)
{
     if (num % 2 == 0 && num % 3 == 0)
     {
         count++;
     }
     num++;
}
```

What value is stored in the variable `count` as a result of executing the code segment?

Unit 4: Iteration (Part A) MCQ

(A) `1`

(B) `3`

(C) `5`

(D) `7`

(E) `8`

31. Consider the following method, which is intended to return the number of *local maximum* values in an array. Local maximum values are array elements that are greater than both adjacent array elements. The first and last elements of an array have only a single adjacent element, so neither the first nor the last array element is counted by this method. For example, an array containing the values `{3, 9, 7, 4, 10, 12, 3, 8}` has two local maximum values: `9` and `12`.

```
public static int countPeaks(int[] data)
{
     int numPeaks = 0;
     for ( /* missing loop header */ )
     {

         {
            numPeaks++;
         }
     }
     return numPeaks;
}
```

Which of the following can replace `/* missing loop header */` so the method `countPeaks` works as intended?

(A) `int p = data.length - 1; p > 0; p--`

(B) `int p = 0; p < data.length; p++`

(C) `int p = 0; p < data.length - 1; p++`

(D) `int p = 1; p < data.length; p++`

(E) `int p = 1; p < data.length - 1; p++`

Unit 4: Iteration (Part A) MCQ

32. Consider the following code segment.

```
String str = "a black cat sat on a table";
int counter = 0;
for (int i = 0; i < str.length() - 1; i++)
{
     if (str.substring(i, i + 1).equals("a") &&
         !str.substring(i + 1, i + 2).equals("b"))
     {
         counter++;
     }
}
System.out.println(counter);
```

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

(A) 1

(B) 2

(C) 3

(D) 5

(E) 6

Unit 4: Iteration (Part A) MCQ

33. Consider the following code segments.

I.
```
int k = 1;
while (k < 20)
{
  if (k % 3 == 1)
    System.out.print( k + " ");

  k = k + 3;
}
```

II.
```
for (int k = 1; k < 20; k++)
{
  if (k % 3 == 1)
    System.out.print( k + " ");
}
```

III.
```
for (int k = 1; k < 20; k = k + 3)
{
  System.out.print( k + " ");
}
```

Which of the code segments above will produce the following output?

1 4 7 10 13 16 19

Unit 4: Iteration (Part A) MCQ

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

34. Consider the following two code segments. Code segment II is a revision of code segment I in which the loop header has been changed.

I.

```
for (int k = 1; k <= 5; k++)
{
     System.out.print(k);
}
```

II.

```
for (int k = 5; k >= 1; k--)
{
     System.out.print(k);
}
```

Which of the following best explains how the output changes from code segment I to code segment II?

(A) Both code segments produce the same output, because they both iterate four times.
(B) Both code segments produce the same output, because they both iterate five times.
(C) Code segment I prints more values than code segment II does, because it iterates for one additional value of `k`.
(D) Code segment II prints more values than code segment I, because it iterates for one additional value of `k`.
(E) The code segments print the same values but in a different order, because code segment I iterates from `1` to `5` and code segment II iterates from `5` to `1`.

35. Consider the following code segment.

```
int count = 5;
while (count < 100)
{
     count = count * 2;
}
count = count + 1;
```

What will be the value of `count` as a result of executing the code segment?

(A) `100`
(B) `101`
(C) `160`
(D) `161`
(E) `321`

Unit 4: Iteration (Part A) MCQ

36. Consider the following code segment.

```
for (int x = 0; x <= 4; x++)      // Line 1
{
     for (int y = 0; y < 4; y++)   // Line 3
     {
         System.out.print("a");
     }
     System.out.println();
}
```

Which of the following best explains the effect of simultaneously changing `x <= 4` to `x < 4` in line 1 and `y < 4` to `y <= 4` in line 3 ?

(A) `"a"` will be printed fewer times because while each output line will have the same length as before, the number of lines printed will decrease by 1.

(B) `"a"` will be printed more times because while the number of output lines will be the same as before, the length of each output line will increase by 1.

(C) `"a"` will be printed the same number of times because while the number of output lines will decrease by 1, the length of each line will increase by 1.

(D) `"a"` will be printed more times because both the number of output lines and the length of each line will increase by 1.

(E) The output of the code segment will not change in any way.

37. Consider the following code segment.

```
for (int k = 1; k <= 7; k += 2)
{
     System.out.print(k);
}
```

Which of the following code segments will produce the same output as the code segment above?

Unit 4: Iteration (Part A) MCQ

(A)
```
for (int k = 0; k < 7; k += 2)
{
     System.out.print(k);
}
```

(B)
```
for (int k = 0; k <= 7; k += 2)
{
     System.out.print(k);
}
```

(C)
```
for (int k = 0; k <= 8; k += 2)
{
     System.out.print(k + 1);
}
```

(D)
```
for (int k = 1; k < 7; k += 2)
{
     System.out.print(k + 1);
}
```

(E)
```
for (int k = 1; k <= 8; k += 2)
{
     System.out.print(k);
}
```

Unit 4: Iteration (Part A) MCQ

38. Consider the following two static methods, where f2 is intended to be the iterative version of f1.

```
public static int f1(int n)
{
 if (n < 0)
 {
   return 0;
 }
 else
 {
   return (f1(n - 1) + n * 10);
 }
}
public static int f2(int n)
{
  int answer = 0;
  while (n > 0)
  {
    answer = answer + n * 10;
    n--;
  }

  return answer;
}
```

The method f2 will always produce the same results as f1 under which of the following conditions?

Unit 4: Iteration (Part A) MCQ

I. n < 0

II. n = 0

III. n > 0

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

39. Consider the following code segment.

```
int value = 15;
while (value < 28)
{
  System.out.println(value);
  value++;
}
```

What are the first and last numbers output by the code segment?

Unit 4: Iteration (Part A) MCQ

(A)

First	Last
15	27

(B)

First	Last
15	28

(C)

First	Last
16	27

(D)

First	Last
16	28

(E)

First	Last
16	29

Unit 4: Iteration (Part A) MCQ

40. Consider the following code segment.

```
int count = 0;
for (int k = 0; k < 10; k++)
{
     count++;
}
System.out.println(count);
```

Which of the following code segments will produce the same output as the code segment above?

(A)
```
int count = 0;
for (int k = 1; k < 10; k++)
{
     count++;
}
System.out.println(count);
```

(B)
```
int count = 1;
for (int k = 1; k <= 10; k++)
{
     count++;
}
System.out.println(count);
```

(C)
```
int count = 1;
for (int k = 0; k <= 9; k++)
{
     count++;
}
System.out.println(count);
```

(D)
```
int count = 0;
for (int k = 9; k >= 0; k--)
{
     count++;
}
System.out.println(count);
```

(E)
```
int count = 0;
for (int k = 10; k >= 0; k--)
{
     count++;
}
System.out.println(count);
```

Unit 4: Iteration (Part A) MCQ

41. Consider the following method.

```
public static int what(String str, String check)
{
     int num = -1;
     int len = check.length();
     for (int k = 0; k + len <= str.length(); k++)
     {
         String a = str.substring(k, k + len);
         if (a.equals(check))
         {
            num = k;
         }
     }
     return num;
}
```

Assume that `check` occurs at least once in `str`. Which of the following best describes the value returned by the `what` method?

(A) The number of times the string `check` occurs in `str`

(B) The index of the first occurrence of `check` inside `str`

(C) The index of the last occurrence of `check` inside `str`

(D) The number of substrings in `str` with the same length as `check`

(E) The number of substrings in `str` that do not match `check`

Unit 4: Iteration (Part A) MCQ

42. Consider the following code segment.

```
/* missing loop header */
{
     for (int k = 0; k < 4; k++)
     {
         System.out.print(k);
     }
     System.out.println();
}
```

The code segment is intended to produce the following output.

```
0123
0123
0123
```

Which of the following can be used to replace `/* missing loop header */` so that the code segment works as intended?

I. `for (int j = 0; j < 3; j++)`
II. `for (int j = 1; j < 3; j++)`
III. `for (int j = 1; j <= 3; j++)`

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

43. Consider the following code segment.

```
for (int num = 0; num < 10; num += 2)
{
     for (int val = 0; val < 5; val++)
     {
         System.out.println("hop");
     }
}
```

How many times will `System.out.println("hop")` be executed?

(A) 0
(B) 5
(C) 10
(D) 25
(E) 50

Unit 4: Iteration (Part A) MCQ

44. Consider the following code segment.

```
int counter = 0;
for (int x = 10; x > 0; x--)
{
     for (int y = x; y <= x; y++)
     {
         counter++;  // line 6
     }
}
```

How many times will the statement in line 6 be executed as a result of running the code segment?

(A) 0

(B) 1

(C) 10

(D) 11

(E) 20

45. Consider the following code segment.

```
int outerMax = 10;
int innerMax = 5;
for (int outer = 0; outer < outerMax; outer++)
{
     for (int inner = 0; inner <= innerMax; inner++)
     {
         System.out.println(outer + inner);
     }
}
```

How many values will be printed when the code segment is executed?

(A) 45

(B) 50

(C) 55

(D) 60

(E) 66

Unit 4: Iteration (Part A) MCQ

46. The following method is intended to print the number of digits in the parameter `num`.

```
public int numDigits(int num)
{
     int count = 0;
     while (/* missing condition */)
     {
         count++;
         num = num / 10;
     }
     return count;
}
```

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

(A) `count != 0`

(B) `count > 0`

(C) `num >= 0`

(D) `num != 0`

(E) `num == 0`

47. Consider the following code segment.

```
int k = 0;
while (k < 10)
{
  System.out.print((k % 3) + " ");
  if ((k % 3) == 0)
    k = k + 2;
  else
    k++;
}
```

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

Unit 4: Iteration (Part A) MCQ

(A) 0 2 1 0 2
(B) 0 2 0 2 0 2
(C) 0 2 1 0 2 1 0
(D) 0 2 0 2 0 2 0
(E) 0 1 2 1 2 1 2

48. Consider the following code segment, which is intended to print the sum of all the odd integers from 0 up to and including 101.

```
int r = 0;
int sum = 0;
/* missing loop header */
{
     if (r % 2 == 1)
     {
          sum += r;
     }
     r++;
}
System.out.println(sum);
```

Which of the following could replace `/* missing loop header */` to ensure that the code segment will work as intended?

(A) `while (r <= 100)`
(B) `while (sum <= 100)`
(C) `while (r < 101)`
(D) `while (r <= 101)`
(E) `while (sum <= 101)`

49. Consider the following code segment.

```
String str = "abcdef";

for (int rep = 0; rep < str.length() - 1; rep++)

{

  System.out.print(str.substring(rep, rep + 2));

}
```

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

Unit 4: Iteration (Part A) MCQ

(A) abcdef
(B) aabbccddeeff
(C) abbccddeef
(D) abcbcdcdedef
(E) Nothing is printed because an IndexOutOfBoundsException is thrown.

50. Consider the following code segment.

```
int a = 24;

int b = 30;

while (b != 0)

{

  int r = a % b;

  a = b;

  b = r;

}


System.out.println(a);
```

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

(A) 0
(B) 6
(C) 12
(D) 24
(E) 30

Unit 4: Iteration (Part A) MCQ

51. Consider the following code segment. Assume that `num3 > num2 > 0`.

```
int num1 = 0;
int num2 = /* initial value not shown */;
int num3 = /* initial value not shown */;
while (num2 < num3)
{
     num1 += num2;
     num2++;
}
```

Which of the following best describes the contents of `num1` as a result of executing the code segment?

(A) The product of `num2` and `num3`

(B) The product of `num2` and `num3 - 1`

(C) The sum of `num2` and `num3`

(D) The sum of all integers from `num2` to `num3`, inclusive

(E) The sum of all integers from `num2` to `num3 - 1`, inclusive

52. Consider the following code segment.

```
for (int outer = 0; outer < 3; outer++)
{
     for (/* missing loop header */)
     {
         System.out.print(outer + "" + inner + "_");
     }
}
```

Which of the following can be used as a replacement for `/* missing loop header */` so that the code segment produces the output `00_01_02_11_12_22_`?

(A) `int inner = 0; inner < 3; inner++`

(B) `int inner = 1; inner < 3; inner++`

(C) `int inner = outer - 1; inner < 3; inner++`

(D) `int inner = outer; inner < 3; inner++`

(E) `int inner = outer + 1; inner < 3; inner++`

Unit 4: Iteration (Part A) MCQ

53. Consider the following code segment.

```
int count = 0;
for (int x = 1; x <= 3; x++)
{
     /* missing loop header */
     {
         count++;
     }
}
System.out.println(count);
```

Which of the following should be used to replace `/* missing loop header */` so that the code segment will print `6` as the value of `count` ?

(A) `for (int y = 0; y <= 2; y++)`

(B) `for (int y = 0; y < 3; y++)`

(C) `for (int y = 2; y >= 0; y--)`

(D) `for (int y = 3; y > 0; y--)`

(E) `for (int y = 0; y < x; y++)`

54. Consider the following code segment.

```
int k = 0;
/* missing loop header */
{
     k++;
     System.out.print(k + " ");
}
```

Which of the following can be used as a replacement for `/* missing loop header */` so that the code segment prints out the string `"1 2 3 4 "`?

(A) `while (k < 3)`

(B) `while (k < 4)`

(C) `while (k < 5)`

(D) `while (k <= 4)`

(E) `while (k <= 5)`

Unit 4: Iteration (Part A) MCQ

55. Consider the following code segment.

```
int val = 48;
int div = 6;
while ((val % 2 == 0) && div > 0)
{
     if (val % div == 0)
     {
         System.out.print(val + " ");
     }
     val /= 2;
     div--;
}
```

What is printed when the code segment is executed?

(A) `48 12 6`

(B) `48 12 6 3`

(C) `48 12 6 3 1`

(D) `48 24 12 6`

(E) `48 24 12 6 3`

Directions: Select the choice that best fits each statement. The following question(s) refer to the following method

```
public static int mystery(int n)
{
  int x = 1;
  int y = 1;

  // Point A

  while (n > 2)
  {
    x = x + y;

    // Point B

    y = x - y;
    n--;
  }

  // Point C

  return x;
}
```

Unit 4: Iteration (Part A) MCQ

56. What value is returned as a result of the call mystery (6)?

(A) 1

(B) 5

(C) 6

(D) 8

(E) 13

57. Which of the following is true of method mystery ?

(A) x will sometimes be 1 at // Point B.

(B) x will never be 1 at // Point C.

(C) n will never be greater than 2 at // Point A.

(D) n will sometimes be greater than 2 at // Point C.

(E) n will always be greater than 2 at // Point B.

Unit 4: Iteration (Part A) MCQ

58. Consider the following method.

```
public void numberCheck(int maxNum)
{
  int typeA = 0;
  int typeB = 0;
  int typeC = 0;

  for (int k = 1; k <= maxNum; k++)
  {
    if (k % 2 == 0 && k % 5 == 0)
      typeA++;
    if (k % 2 == 0)
      typeB++;
    if (k % 5 == 0)
      typeC++;
  }

  System.out.println(typeA + " " + typeB + " " + typeC);
}
```

What is printed as a result of the call `numberCheck(50)` ?

(A) 5 20 5
(B) 5 20 10
(C) 5 25 5
(D) 5 25 10
(E) 30 25 10

Unit 4: Iteration (Part A) MCQ

59. Consider the following code segment.

```
int[] numbers = new int[5];
numbers[0] = 2;
numbers[1] = numbers[0] + 1;
numbers[numbers[0]] = numbers[1];

for (int x = 3; x < numbers.length; x++)
{
     numbers[x] = numbers[x - 1] * 2;
}
```

Which of the following represents the contents of the array `numbers` after the code segment is executed?

(A) `{2, 3, 0, 0, 0}`

(B) `{2, 3, 1, 2, 4}`

(C) `{2, 3, 3, 6, 9}`

(D) `{2, 3, 3, 6, 12}`

(E) `{2, 4, 8, 16, 32}`

60. Consider the following output.

```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
1 2 3 4 5 6
```

Which of the following code segments will produce the output shown above?

Unit 4: Iteration (Part A) MCQ

(A)
```
for (int j = 1; j <= 6; j++)
{
  for (int k = 1; k < j; k++)
    System.out.print(" " + k);
  System.out.println();
}
```

(B)
```
for (int j = 1; j <= 6; j++)
{
  for (int k = 1; k <= j; k++)
    System.out.print(" " + j);
  System.out.println();
}
```

(C)
```
for (int j = 1; j <= 6; j++)
{
  for (int k = 1; k <= j; k++)
    System.out.print(" " + k);
  System.out.println();
}
```

(D)
```
for (int j = 1; j < 6; j++)
{
  for (int k = 1; k <= j; k++)
    System.out.print(" " + k);
  System.out.println();
}
```

(E)
```
for (int j = 1; j < 6; j++)
{
  for (int k = 1; k < j; k++)
    System.out.print(" " + k);
  System.out.println();
}
```

61. Consider the following code segment.

```
int num = 1;
while (num < 5)
{
     System.out.print("A");
     num += 2;
}
```

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

(A) `A`

(B) `AA`

(C) `AAA`

(D) `AAAA`

(E) `AAAAA`

Unit 4: Iteration (Part A) MCQ

62. Consider the following code segment.

```
for (int j = 0; j < 3; j++)
{
     for (int k = 0; k < 4; k++)
     {
         System.out.println("Fun");
     }
}
```

Which of the following best explains how changing the outer `for` loop header to `for (int j = 0; j <= 3; j++)` affects the output of the code segment?

(A) The output of the code segment will be unchanged.

(B) The string `"Fun"` will be printed more times because the outer loop will execute more times.

(C) The string `"Fun"` will be printed more times because the inner loop will execute more times in each iteration of the outer loop.

(D) The string `"Fun"` will be printed fewer times because the outer loop will execute fewer times.

(E) The string `"Fun"` will be printed fewer times because the inner loop will execute fewer times in each iteration of the outer loop.

63. The question refer to the following code segment.

```
int k = a random number such that 1 ≤ k ≤ n ;

for (int p = 2; p <= k; p++)

  for (int r = 1; r < k; r++)

    System.out.println("Hello");
```

What is the maximum number of times that Hello will be printed?

(A) 2

(B) $n - 1$

(C) $n - 2$

(D) $(n - 1)^2$

(E) n^2

Unit 4: Iteration (Part A) MCQ

64. The question refer to the following code segment.

```
int k = a random number such that 1 ≤ k ≤ n ;
for (int p = 2; p <= k; p++)
  for (int r = 1; r < k; r++)
    System.out.println("Hello");
```

What is the minimum number of times that Hello will be printed?

(A) 0
(B) 1
(C) 2
(D) n - 1
(E) n - 2

65. Consider the following code segment.

```
for (int outer = 0; outer < n; outer++)
{
  for (int inner = 0; inner <= outer; inner++)
  {
    System.out.print(outer + " ");
  }
}
```

If n has been declared as an integer with the value 4, what is printed as a result of executing the code segment?

(A) 0 1 2 3
(B) 0 0 1 0 1 2
(C) 0 1 2 2 3 3 3
(D) 0 1 1 2 2 2 3 3 3 3
(E) 0 0 1 0 1 2 0 1 2 3

Unit 4: Iteration (Part A) MCQ

66. Which of the following code segments will print all multiples of 5 that are greater than 0 and less than 100 ?

```
I. for (int k = 1; k < 100; k++)
{
   if (k % 5 == 0)
   {
      System.out.print(k + " ");
   }
}

II. for (int k = 1; k < 100; k++)
{
   if (k / 5 == 0)
   {
      System.out.print(k + " ");
   }
}

III. int k = 5;
while (k < 100)
{
   System.out.print(k + " ");
   k = k + 5;
}
```

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

67. Consider the following method.

```
public static void printSome(int num1, int num2)
{
     for (int i = 0; i < num1; i++)
     {

         {
            System.out.print(i + " ");
         }
     }
}
```

Which of the following method calls will cause `"0 10 "` to be printed?

Unit 4: Iteration (Part A) MCQ

(A) `printSome(0, 20)`

(B) `printSome(5, 10)`

(C) `printSome(10, 5)`

(D) `printSome(20, 5)`

(E) `printSome(25, 5)`

68. Consider the following recursive method.

```
public static void stars(int num)
{
     if (num == 1)
     {
         return;
     }
     stars(num - 1);
     for (int i = 0; i < num; i++)
     {
         System.out.print("*");
     }
     System.out.println();
}
```

What is printed as a result of the method call `stars(5)` ?

(A)
```
*****
**
***
****
*****
```

(B)
```
*
**
***
****
*****
```

(C)
```
*****
****
***
**
*
```

(D)
```
*****
****
***
**
*
```

(E)

Unit 4: Iteration (Part A) MCQ

69. Consider the following code segment.

```
int val = 1;
while (val <= 6)
{
     for (int k = 0; k <= 2; k++)
     {
         System.out.println("Surprise!");
     }
     val++;
}
```

How many times is the string `"Surprise!"` printed as a result of executing the code segment?

(A) 3

(B) 6

(C) 12

(D) 15

(E) 18

70. Consider the following code segment.

```
for (int k = 0; k < 9; k = k + 2)
{
     if ((k % 2) != 0)
     {
         System.out.print(k + " ");
     }
}
```

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

(A) `0 2 4 6 8 10`

(B) `0 2 4 6 8`

(C) `1 3 5 7 9`

(D) `1 3 5 7`

(E) Nothing is printed.

Unit 4: Iteration (Part A) MCQ

71. Consider the following method.

```
public static String rearrange(String str)
{
     String temp = "";
     for (int i = str.length() - 1; i > 0; i--)
     {
         temp += str.substring(i - 1, i);
     }
     return temp;
}
```

What, if anything, is returned by the method call `rearrange("apple")` ?

(A) `"appl"`

(B) `"apple"`

(C) `"elppa"`

(D) `"lppa"`

(E) Nothing is returned due to a run-time error.

72. Consider the following method.

```
public static String abMethod(String a, String b)
{
     int x = a.indexOf(b);
     while (x >= 0)
     {
         a = a.substring(0, x) + a.substring(x + b.length());
         x = a.indexOf(b);
     }
     return a;
}
```

What, if anything, is returned by the method call `abMethod("sing the song", "ng")` ?

(A) `"si"`

(B) `"si the so"`

(C) `"si the song"`

(D) `"sig the sog"`

(E) Nothing is returned because a `StringIndexOutOfBoundsException` is thrown.

Unit 4: Iteration (Part A) MCQ

73. Consider the following method.

```
public int sol(int lim)
{
  int s = 0;

  for (int outer = 1; outer <= lim; outer++)
  {
    for (int inner = outer; inner <= lim; inner++)
    {
      s++;
    }
  }

  return s;
}
```

What value is returned as a result of the call `sol(10)`?

(A) 20
(B) 45
(C) 55
(D) 100
(E) 385

Unit 4: Iteration (Part A) MCQ

74. Consider the following method.

```
public String wordPlay(String word)
{
     String str = "";
     for (int k = 0; k < word.length(); k++)
     {
         if (k % 3 == 0)
         {
            str = word.substring(k, k + 1) + str;
         }
     }
     return str;
}
```

The following code segment appears in another method in the same class as `wordPlay`.

```
System.out.println(wordPlay("Computer Science"));
```

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

(A) `C`

(B) `ci tm`

(C) `eeStm`

(D) `ncepC`

(E) `eeSepC`

Unit 4: Iteration (Part A) MCQ

75. Consider the following method.

```
public static void methodX(int[] values)
{
     for (int j = 0; j < values.length - 1; j++)
     {
         for (int k = j + 1; k < values.length; k++)
         {
            if (values[k] < values[j])
            {
           values[j] = values[k];
            }
         }
     }
}
```

The following code segment appears in another method of the same class.

```
int[] numbers = {45, 1, 56, 10};
methodX(numbers);
```

Which of the following represents the contents of the array `numbers` after the code segment is executed?

(A) `{1, 1, 10, 10}`

(B) `{1, 10, 45, 56}`

(C) `{45, 1, 56, 10}`

(D) `{45, 45, 56, 45}`

(E) `{56, 45, 10, 1}`

76. Consider the following code segment.

```
int num = 1;
for (int k = 2; k < 10; k++)
{
     num = 0;
     num = num + k;
}
```

What will be the value of `num` after the loop is executed?

(A) `2`

(B) `9`

(C) `10`

(D) `44`

(E) `45`

Unit 4: Iteration (Part A) MCQ

77. Consider the following method.

```
public static String changeStr(String str)
{
     String result = "";
     for (int i = str.length() - 1; i >= str.length() / 2; i -= 2)
     {
         result += str.substring(i, i + 1);
     }
     return result;
}
```

What value is returned as a result of the method call `changeStr("12345")` ?

(A) `"4"`

(B) `"53"`

(C) `"531"`

(D) `"543"`

(E) `"54321"`

78. Consider the following code segment.

```
for (int j = 1; j < 10; j += 2)
{
     System.out.print(j);
}
```

Which of the following code segments will produce the same output as the code segment above?

Unit 4: Iteration (Part A) MCQ

(A)
```
int j = 1;
while (j < 10)
{
     j += 2;
     System.out.print(j);
}
```

(B)
```
int j = 1;
while (j < 10)
{
     System.out.print(j);
     j += 2;
}
```

(C)
```
int j = 1;
while (j <= 10)
{
     j += 2;
     System.out.print(j);
}
```

(D)
```
int j = 1;
while (j >= 10)
{
     j += 2;
     System.out.print(j);
}
```

(E)
```
int j = 1;
while (j >= 10)
{
     System.out.print(j);
     j += 2;
}
```

79. Consider the following code segment.

```
int num1 = 0;

int num2 = 3;

while ((num2 != 0) && ((num1 / num2) >= 0))

{

  num1 = num1 + 2;

  num2 = num2 - 1;

}
```

What are the values of numl and num2 after the while loop completes its execution?

Unit 4: Iteration (Part A) MCQ

(A) num1 = 0, num2 = 3
(B) num1 = 8, num2 = -1
(C) num1 = 4, num2 = 1
(D) num1 = 6, num2 = 0
(E) The loop will never complete its execution because a division by zero will generate an ArithmeticException.

80. Consider the following code segment.

```
int k = 1;

while (k < 20)

{

  if ((k % 3) == 1)

    System.out.print(k + " ");


  k++;

}
```

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

(A) 2 5 8 11 14 17
(B) 3 6 9 12 15 18
(C) 1 4 7 10 13 16 19
(D) 1 3 5 7 9 11 13 15 17 19
(E) 2 4 6 8 10 12 14 16 18 20