Worksheet W.A.23.1 Name ______________________________

ORDER OF ALGORITHMS

Determine the order of the following algorithms:

Question 1:

```
int answer(int n)
{
  if (1 == n)  return 2;
  else return  2 * answer (n - 1);
}
```

a. O(1) b. O(log n) c. O(n) d. O(n^2) e. O(2^n) Answer = ________

Briefly justify your answer:

Question 2:

Assume the following definitions apply in question 2:

```
final int N = 100;

boolean[][] data = new boolean[N][N];

void invert(boolean[][] data)
{
  for (int row = 0; row < N; row++)
    for (int col = 0; col < N; col++)
      data[row][col] = (0 == data[row][col]);
}
```

a. O(1) b. O(log n) c. O(n) d. O(n^2) e. O(2^n) Answer = ________

Briefly justify your answer:

Question 3:

```
/*
   This program finds the most frequently occurring value in a list of numbers stored
   in a text file, shortnum.txt.  If there are multiple answers, the algorithm will
   find only one of them.  The integers in the file range from 1..M, and there are N
   values in the file.
*/
import chn.util.*;

public class TestOrder
{
  public static void main(String[] args)
  {
    final int M = 100;
    FileInput inFile;
    int largestCount = Integer.MIN_VALUE;
    int count, number, mode = 0;

    for (int loop = 1; loop <= M; loop++)
    {
      inFile = new FileInput("shortnum.txt");
      count = 0;
      while (inFile.hasMoreTokens())
      {
        number = inFile.readInt();
        if (loop == number)
          count++;
      }
      if (count > largestCount)
      {
        largestCount = count;
        mode = loop;
      }
      inFile.close();
    }
    System.out.println("mode = " + mode);
  }
}
```

How many times will the statement, **`if`** `(loop == number)` be executed?

a. N b. M c. N^2 d. M^2 e. N x M   Answer = ________

Briefly justify your answer:

Question 4:

Assume the following definitions apply in Question 3:

```
final int N = 100;

int[] list = new list[N];

void reverse (int[] numbers)
{
   int temp;

   for (int loop = 0; loop <= (N-1)/2; loop++)
   {
      temp = numbers [loop];
      numbers [loop] = numbers [N-loop-1];
      numbers [N-loop-1] = temp;
   }
}
```

a. O(1)   b. O(log n)   c. O(n)   d. O(n^2)   e. O(2^n)   Answer = ________

Briefly justify your answer: