Worksheet 10 - Solution
CS/ECE 354 - Spring 2016

Due: April 29th 2016 (Friday) in class

Read the following code and answer the questions that follow:

```c
#include <stdio.h>
#include <stdlib.h>
#define N 10

int arr_sum = 0;
static int count = 0;

int sum(int a, int b)
{
    count++;
    return a+b;
}

int main()
{
    int *parray = malloc(sizeof(int) * N);
    int i = 0;
    // Initialize the contents of the array.
    for (i = 0; i < N; ++i) {
        parray[i] = i;
    }
    // Add the elements in the array.
    for (i = 0; i < N; ++i) {
        arr_sum = sum(arr_sum, parray[i]);
    }
    printf("The sum of the elements in the array = %d\n", arr_sum);
    printf("The number of times sum() was called = %d\n", count);
    return 0;
}
```
1. During which phase of the build process (preprocessing, compiling, assembling, linking), will the value for the macro \( N \) be substituted in the source code?

**PREPROCESSING**

2. During which phase of the build process, will the comments in the source code be removed?

**PREPROCESSING**

3. In which part of the program memory (code, data, stack, and heap) are the following variables stored?
   a. Global integer variable `arr_sum` - DATA
   b. Static integer variable `count` - DATA
   c. The pointer variable `parray` in `main()` - STACK
   d. The 40 bytes of memory allocated using `malloc` - HEAP
   e. Automatic integer variable `i` - STACK

4. Which part of the program memory is the following binary version of the function `sum()` stored? **CODE SEGMENT**

```
00000000 <sum>:
  0: 55    push %ebp
  1: 89 e5 mov %esp,%ebp
  3: a1 04 00 00 00 mov 0x4,%eax
  8: 83 c0 01 add $0x1,%eax
 b: a3 04 00 00 00 mov %eax,0x4
10: 8b 55 08 mov 0x8(%ebp),%edx
13: 8b 45 0c mov 0xc(%ebp),%eax
16: 01 d0 add %edx,%eax
18: 5d pop %ebp
19: c3 ret
```