Homework 3

I. Use the memory mountain in Figure 6.41 in your text book (csapp) to estimate the time, in CPU cycles, to read an 8-byte word from the L1 d-cache.

from L1 is about 12,000 MB/s,

the clock frequency is 2,100 MHz,

the individual read accesses are in units of 8-byte longs.

Thus, from this graph we can estimate that it takes roughly $2,100/12,000 \times 8 = 1.4 \approx 1.5$ cycles to access a word from L1 on this machine

II. Assume we compile the code

foo.c:

```
const int const_five = 5 ;
const int const_two = 2 ;
int five= 5;
int two = 0;
int uninitialized;
static int static_ten = 10;
static int static_uninit;

int f() {
      static f_static_i = 10;
      int f_i = 0;
}
int main() {
}
```

Please fill the following table:
(Note: show the distinction between .bss and COMM)

Symbol	.symtab entry?	Symbol type	Global/Local	Section
const_five	T	OBJECT	G	.rodata
const_two	T	OBJECT	G	.rodata
five	T	OBJECT	G	.data
two	T	OBJECT	G	.bss
uninitialized	T	OBJECT	G	COMM
static_ten	T	OBJECT	L	.data
static_uninit	T	OBJECT	L	.bss
f	T	FUNC	G	.text
f_static_i	T	OBJECT	L	.data
f_i	F			
main	T	FUNC	G	.text

III. This problem concerns the m.o module from Figure 7.5 in the text book (csapp) and the following version of the swap.c function that counts the number of times it has been called:

```
extern int buf[];
int *bufp0 = &buf[0];
static int *bufp1;
static void incr()
{
        static int count=0;
        count++;
}

void swap()
{
        Int temp; 16
        incr();

        bufp1 = &buf[1];
        temp = *bufp0;
        *bufp0 = *bufp1;
```

```
        *bufp1 = temp;
}
```

For each symbol that is defined and referenced in swap.o , indicate if it will have a symbol table entry in the .symtab section in module swap.o . If so, indicate the module that defines the symbol (swap.o or m.o), the symbol type(local, global, or extern), and the section (.text, .data , or .bss) it occupies in that module.

Symbol	.swap.o .symtab entry?	Symbol type	Module where defined	Section
buf	yes	Extern	m.o	.data
bufp0	yes	Global	Swap.o	.data
bufp1	yes	Local	Swap.o	.bss
swap	yes	Global	Swap.o	.text
temp	no			
incr	yes	Local	Swap.o	.text
count	yes	Local	Swap.o	.bss