CS 31 Homework 3: C Pointers

Due at 11:59pm on Monday, February 17th, 2025

Names, usernames, and lab sections:

Question 1

Consider the following declarations and assignments:

```
int a, *b, *c, d[4];
for (a = 0; a < 4 ; a++) {
    d[a] = 1 + a;
}
b = d;
c = &a;
a = b[3];</pre>
```

Describe the **type** and **value** of each of the expressions below. The **type** should be one of: int, int * (int pointer), or int [] (int array). For the **value**, if the expression is an address, describe what it is the address of. If an expression is invalid, write "Illegal Expression".

		TYPE	VALUE
1.	a		
2.	b		
3.	*b		
4.	с		
5.	d		
6.	&d[1]		

Question 2

A. Trace through the following C code, and draw the contents of memory (heap and stack) at the point indicated.

B. Show the output produced by a complete run of the program at "DRAW MEMORY WHEN YOU GET HERE."

Note: Assume stdio.h and stdlib.h have been included, and that malloc always succeeds. Remember that the stack grows from the bottom and the heap grows from the top.

MEMORY

```
int *func(int *a, int *b, int s);
int main (void) {
    int *arr = NULL, x = 4, y = 3, i;
    arr = func(&x, &y, 5);
    printf("x = %d y = %d n", x, y);
    if (arr != NULL) {
        for (i = 0; i < 5; i++) {
            printf("arr[%d] = %d\n",
                    i, arr[i]);
        }
    }
    free(arr);
    return 0;
}
int *func(int *a, int *b, int s) {
    int *tmp, i;
    tmp = malloc(sizeof(int) * s);
    if (tmp != NULL) {
        for (i = 0; i < s; i++) {
            tmp[i] = i + *b;
        }
        *a = tmp[2];
        *b = 8;
    }
    // DRAW MEMORY WHEN YOU GET HERE
    return tmp;
}
```

OUTPUT
