CS31 Written Homework 4: C Pointers   Name:

Due Thurs, Oct 10 in class

Question 1

Consider the following declarations and assignments:

```
int *a, b[5], c, *d;

for (c=0; c < 5 ; c++)  {
    b[c]= 1+c;
}
d=b;
a = &c;
c = d[3];
```

What are the TYPE and VALUE of each of the following expressions (if the expression is invalid, write "Illegal Expression", and if it is an address describe what it is the address of):

```
                        TYPE                    VALUE


1.   a
                   -------------           -------------


2.   b
                   -------------           -------------



3.   c
                   -------------           -------------



4.   &b[1]
                   -------------           -------------


5.   d
                   -------------           -------------


6.   *d
                   -------------           -------------
```

Question 2

Trace through the following C code, and draw memory contents (heap and stack) at the execution point indicated in foo, and show the output produced by a complete run of the program. (Assume stdio.h and stdlib.h have been included, and that malloc succeeds.)

```
                                                         MEMORY
                                                         ------
int *foo(int *a, int *b, int s);

int main () {
    int *arr = NULL, x = 6, y = 7, i;

    arr = foo(&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 *foo(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
------
```