Name : _____ CS 100 Final Exam

What is the output of the C program shown below

```
#include <stdio.h>

int f(int num) {
     if (num == 0) return 0;
     return 2 * num - 1 + f(num-1);
}

int main(void) {
     printf("%d\n", f(2) );
     printf("%d\n", f(4) );
     printf("%d\n", f(5) );
     printf("%d\n", f(9) );
     printf("%d\n", f(0) );
     return 0;
}
```

What is the output of the C program below when run with **./a.out DATA 5 3 2 4 1**

DATA
3 1 4 1 5
9 2 6 5 3
5 8 9 7 9
3 2 3 8 4

```
#include <stdio.h>
#include <stdlib.h>

int main(int argc, char *argv[]) {
     FILE *fp = fopen(argv[1], "r");
     int a, b, c, d, e;
     for (a = 2; a < argc; a++) {
          e = 0;
          c = atoi(argv[a]);
          for (b=0; b<c; b++) {
               fscanf(fp, "%d", &d);
               e = e + d;
          }
          printf("%d\n", e);
     }
     return 0;
}
```

What is the output of the C program shown below

```
#include <stdio.h>
#include <string.h>
#include <stdlib.h>

typedef struct node {
     char *name;
     struct node *next;
} Node;

void function(Node *ptr, int num) {
     int a, x = num % 10, y = num / 10;
     for (a=0; a<x; a++)
          ptr = ptr->next;
     printf("%c\n", ptr->name[y]);
     return;
}

Node *add(Node *ptr, char *name) {
     Node *newNode = malloc( sizeof(Node) );
     newNode->name = malloc( strlen(name) + 1 );
     strcpy(newNode->name, name);
     newNode->next = ptr;
     return newNode;
}

int main(void) {
     Node *myList = NULL;
     myList = add(myList, "UNIVERSITY");
     myList = add(myList, "OF");
     myList = add(myList, "ALABAMA");
     myList = add(myList, "CRIMSON");
     myList = add(myList, "TIDE");
     function(myList, 12);
     function(myList, 3);
     function(myList, 30);
     function(myList, 64);
     function(myList, 0);
     return 0;
}
```