

# ISU Programming Assessment, March 2, 2018

Name: \_\_\_\_\_ CS class \_\_\_\_\_

Put all answers in boxes. Nothing you write outside the boxes will be counted. Did you bring an eraser?

1. Write a C program that gets a number,  $n$ , from the user. The program will print  $n$  lines. Each line consists of first, of some B's, then some A's for a combined total of  $n$  characters. The first line will have no B's just A's. Each new line will have one more B and one fewer A. Example:  $n=3$

```
AAA
BAA
BBA
```

```
int main(int argc, char *argv[]) {
```

```
    return 0;
}
```

2. Write a C program that reads from stdin one 8-bit character at a time. The program should count all letters read. If a digit (0-9) is read the program should print "digit" and stop. Otherwise the program should print only the final count of the number of letters.

```
int main(int argc, char *argv[]) {
```

```
    return 0;
}
```

3. Write the function `searchMax` that is passed the address of the first node of the list. It returns the address of the node that contains the maximum value in the list or 0 (NULL) if the list is empty.

```
typedef struct NODE {
    int data;
    struct NODE *next;
} node_t;

node_t *searchMax(node_t *curr) {
```

```
}
```

4. A BST is constructed in the usual way using the node definition below. Write a function

```
int countEven(bst_node_t *curr)
```

that returns the number of nodes with even data in the sub-tree with root `*curr`.

```
typedef struct BST_NODE_T {
    int data;
    struct BST_NODE_T *left, *right;
} bst_node_t;
```

5. Write the function

```
int unequalHalves(int n)
```

that returns a 0 or a 1. It returns a 1 **only if** all the following sixteen pairs of bits are NOT equal:

for  $i = 0, 1, 2, \dots, 15$ , we have  $b_i \neq b_{i+16}$

