

ISU Programming Assessment, Nov 08, 2019

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 program that gets an integer, **n**, from the user and then prints **n** patterns. Each pattern consists of some **X**'s then some **Y**'s, then one **Z**. The first pattern is one **X** followed by **n** **Y**'s, then a **Z**. Each new pattern has one more **X** and one fewer **Y** than the previous pattern. **Example:** if **n=3**, then the program will print **YYYYZXXYYZXXXYZ**

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

```
    return 0;  
}
```

2. **Get input a character at a time.** Write a program that counts the total number of sequences consisting of an upper case letter followed by a decimal digit. It should print out the only the final count.

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

```
    return 0;  
}
```

3. Write the function `altSum` that is passed the address of the head node of the list. The function computes the alternating sum of the data. It should return the final total. If the data is: 30, 10, 6 it will return 26.

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

int altSum(node_t *curr) {
```

```
}
```

4. A BST is constructed in the usual way using the node definition below. **Missing Children:** We say that a node is missing 2 children if it has no children. If it has only one child, then it is missing 1 child. Finally if it has two children it is missing 0 children. **Write** the function

```
int nMC( bst_node_t *curr)
```

that is passed address 0 or the address of the root node of the BST. It returns the total number of missing children in the tree.

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

5. Write the function

```
int num01(int n)
```

where **n** is a 32-bit int. The function counts the number of **01** sequences in the 32 bits of **n**. It should return the final count. **Example:** there are 3 **01** sequences in the 8 bits **00101011**.