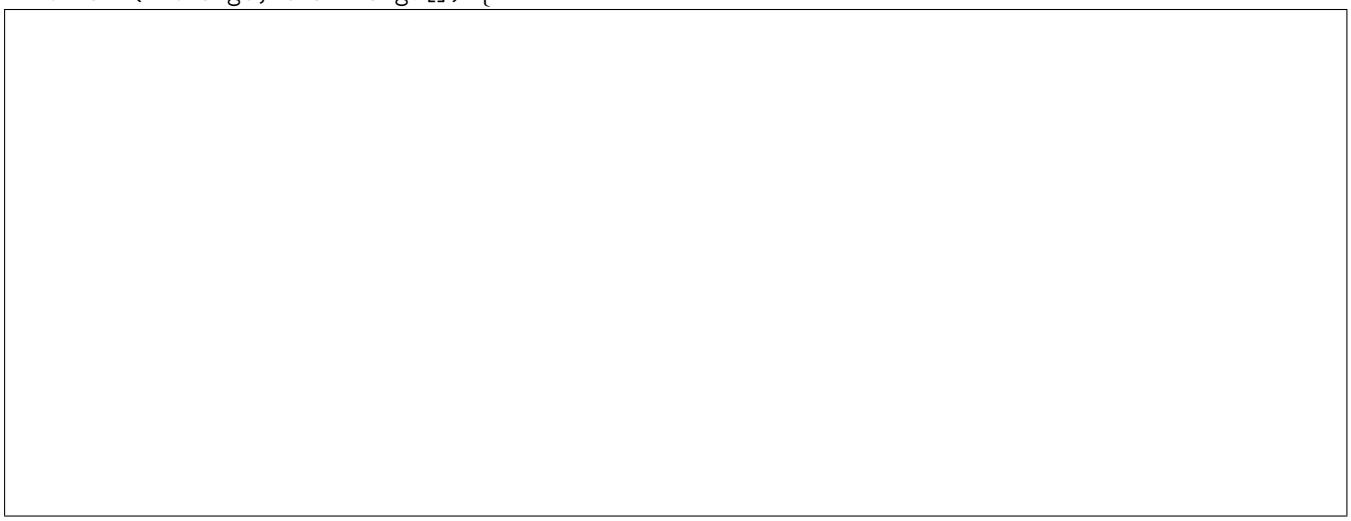
ISU Programming Assessment, Sept 21, 2018

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 program that gets an integer, `n,` from the user and then prints `n` repetitions of the pattern: some `A`'s, some `B`'s, then some `C`'s. Each new repetition has two less `A`'s, one more B, and one more `C` than the pattern before it. The first pattern has `2*n-1 A`'s and `1 B` and `1 C`. **Example:** if the number from the user is `n=4`, then the program prints: `AAAAAAABCAAAAABBCCAAABBBCCCABBBBCCCC`

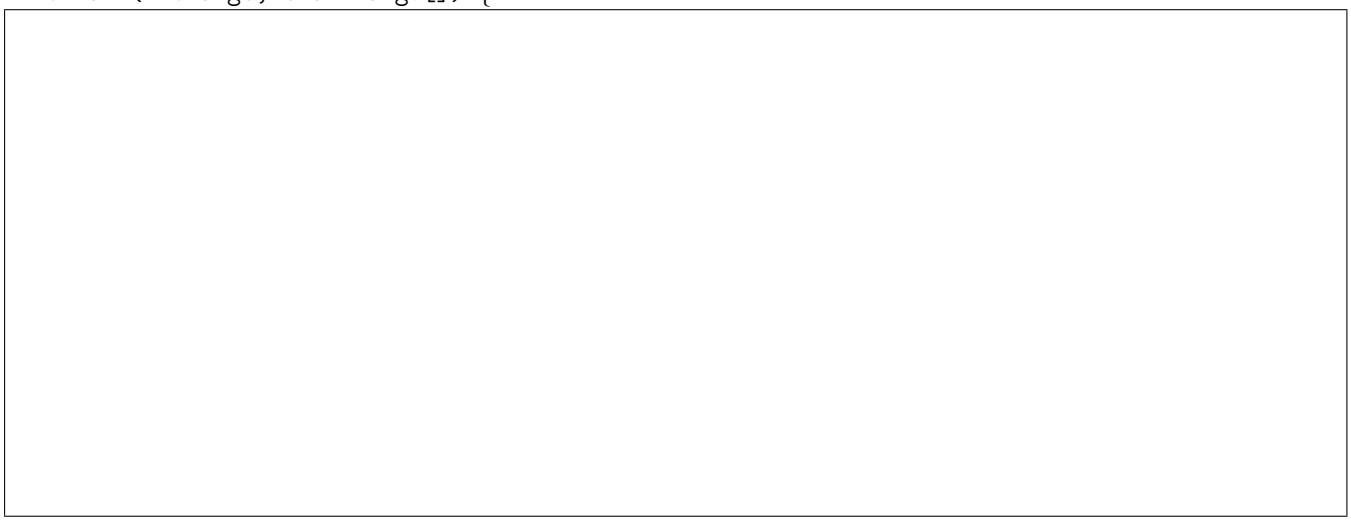
```
int main(int argc, char *argv[]) {
```



```
  return 0;
}
```

2. **Getting input a character at a time.** Write a program that counts the number of times the sequence period, space, space (.␣␣) occurs. It should print only the final total.

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

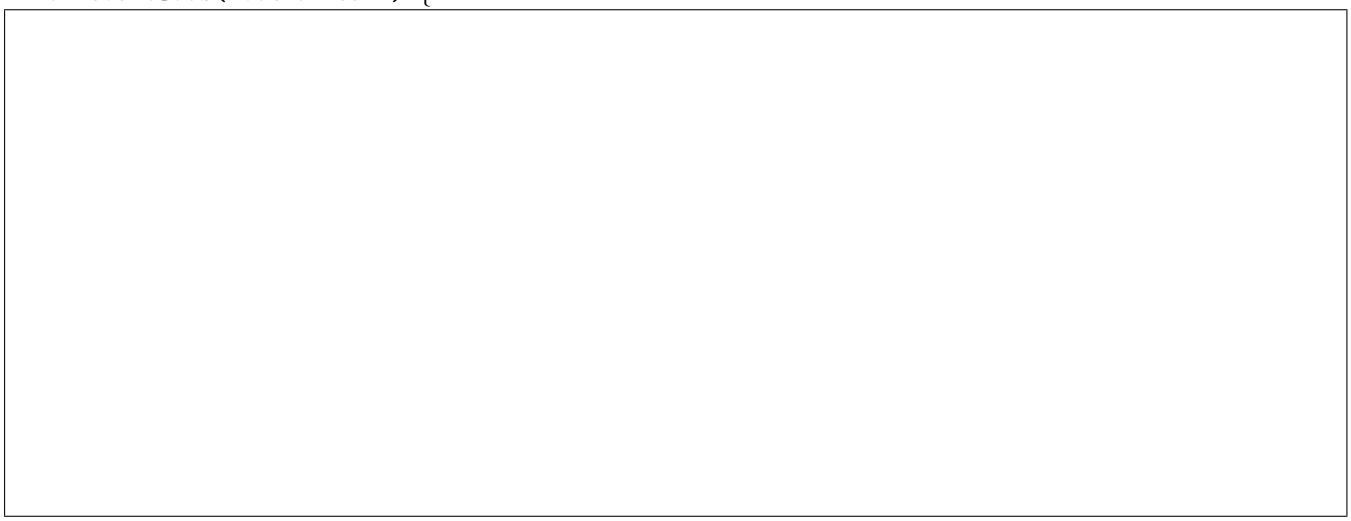


```
  return 0;
}
```

3. Write the function `countOdds` that is passed the address of the first node of the list. The function counts the number of odd numbers in the list. It returns the final total.

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

int  countOdds(node_t *curr) {
```



```
}
```

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

```
int maxDepth( bst_node_t *curr)
```

that returns the number of levels beneath the curr node.

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

5. Write the function

```
int equalOnes(int n)
```

where `n` is a 32–bit int. The function compares the number of 1's in the high half, $b_{31}b_{30}...b_{17}b_{16}$, with the number of 1's in the low half, $b_{15}b_{14}...b_1b_0$. If these numbers match the function returns returns a 1, otherwise it returns a 0.