ISU Programming Assessment, April 19, 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 `U`'s then some `O`'s. The first pattern is one `U` followed by one `O`. Each new pattern has one more `U` and one more `O` than the previous. **Example:** if `n=4,` then the program will print `UOUUOOUUUOOOUUUUOOOO`.

```
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 lower case `t` followed by either a period or a space. It should print out the only the final count.

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

    return 0;
}
```

3. Write the function `lastTwo` that is passed the address of the head node of the list. The function prints the data of the last two nodes in the list. Nothing else is printed. You can assume that the list has at least two nodes.

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

```
int  lastTwo(node_t *curr) {
```

```
    }
```

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

```
        int sumNodeW2C( bst_node_t *curr)
```

that is passed address 0 or the address of the root node of the BST. It returns the sum of the data of all nodes that have two children.

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

5. Write the function

```
        int mirror(int n)
```

where `n` is a 32–bit int. The function returns 1 if the lower and upper halves are mirror images of each other and returns 0 otherwise.

Mirror Image: Bits b_{16+i} and b_{15-i} are equal for $i = 0, 1, 2, ..., 15$.