ISU Programming Assessment, Nov 09, 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 `X`'s then some `O`'s. The first pattern, (`pattern 1`), has one `X` then one `O`. Let `p` stand for 2, 3, or higher. The `p`-th pattern (`pattern p`) has `p` more `X`'s and one more `O` than the pattern before it.

Example: if `n=3,` then the program will print `XOXXXOOXXXXXXOOO`

```
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 a period, then a newline, then a second newline (.\n\n). It should print out the only the final count.

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

```
  return 0;
}
```

3. Write the function `square` that is passed the address of the first node of the list. The function replaces the data in each node with its square.

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

int  square(node_t *curr) {
```

}

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

```
void rotate( bst_node_t *curr)
```

that is passed a pointer to the node containing `A`. **See the picture on the next page.** It changes some pointers to make the BST correspond to the AFTER picture.

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

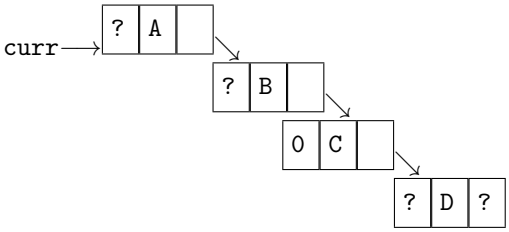
5. Write the function

```
int count1(int n)
```

where `n` is a 32–bit int. The function counts and returns the number of 1 bits in `n`.

Problem 4 pictures:

`BEFORE:`



`AFTER:`