

Programming Assessment

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04/29/2020

1. Write a C program that gets an integer n from `stdin` and then prints n repetitions of the following pattern: some X's, followed by some Y's, followed by some Z's. Start with $n + 1$ X's and 3 Z's. Each repetition should have 1 less X and 2 more Z's, and should have $\frac{\# \text{ of X's} + \# \text{ of Z's}}{2}$ Y's. For example, if the input is $n = 3$, the output should be `XXXXYYYYZZXXXXYYYYZZZZXXYYYYZZZZZZ`.
2. Write a C program that reads one character at a time and counts all occurrences of a capital letter followed by a lowercase letter and a digit, in that order. Do not count if the lowercase letter is a `z`. For example, if the input is `Ab1 Dz3 dv5 Lf9`, the output would be 2.
3. Using the following definition of a node to complete this problem. Write a C function called `greater` that is passed the first node of a linked list and returns the count of all nodes whose data value is greater than that of the node before it. Remember to skip the head node.

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

4. Use the following definition of a BST node to complete this problem. Write a C function called `level` that accepts two arguments, the first being a node in the tree and the second being the current level of the tree. The function would be called with the root node as the first argument and 0 as the second. Print the data of all nodes at level 3 in the tree.

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

5. Write a C function called `reverse_bits` that takes an `unsigned int x` as an argument and returns an `unsigned int` that contains the reversed bits of x .