

ISU Programming Assessment, Nov 27 2017

Name: _____ CS class (and class account if you have one): _____

Put all answers in the boxes. Nothing you write outside of the boxes will be counted. Did you bring an eraser?

1. Write a C program that uses a loop to print all perfect squares between 1 and one million that are also a multiple of 6. Note that the first two integers printed will be 36 and 144 (which is $(6 \times 2)^2$).

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

```
    return 0;  
}
```

2. Write a C program that reads from stdin and prints "integer" if **all** characters read are decimal digits, and "not" otherwise. Note that if 123456 is read, the program would output "integer"; If 123 456 (*with a space*) is read, the program would output "not".

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

```
    return 0;  
}
```

3. Write a loop that computes the fraction of strings in a linked list that start with a capital letter. Use the types and variables declared below. If the list had the three strings - The, it, 123 - then the correct output would be 0.333

```
typedef struct NODE {
    char *str;
    struct NODE *next;
} node_t;

int main(int argc, char *argv[]) {
    node_t *head, *ptr;
    /* Assume that the list is somehow created here. */
```

```
    return 0;
}
```

4. Write a function named `rangePrint` that has the root of a binary tree as parameter, has two integers as parameters, and prints the data for all nodes that have their value in between the two integer values given as parameter (inclusive). Use the following type declaration.

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

5. Write a C function named `make7` that takes an `unsigned char` as parameter and returns an `unsigned char` that is the last 7 bits from the parameter. `make7(0xf0)` would return `0x70` (112 in decimal, or 'p' as a character), and `make7(0x61)` would return `0x61` (97 in decimal, or 'a' as a character).