CS1100 Section-1 Quiz-2 **Date:** May 31, 2021

Duration: 1.00 hour **Max. Marks:** 20

Instructions

- This quiz contains 10 questions. All questions are compulsory.
- You need to solve this quiz on your own without referring to any source, without using internet resources and without trying codes in repl.it or any IDE. You are allowed and encouraged to work out the problems on a sheet of paper.
- Answers to this quiz have to be submitted using a google form (link shared over email). Be as precise as possible while answering the questions.
- We expect you to submit the google form only once. In case of multiple submissions, only the latest one will be considered.
- As a backup you may want to write down your answers clearly on a sheet of paper and if you face any internet issues, you can send a scanned copy of the A4 sheet to your TA. Please use this as a last resort.
- All the best!

1. (1 point) Fill in the blank to compute the variable `z` the greatest common divisor of two positive integers `x` and `y`. You may assume that there exists a function `lcm(x, y)` which returns the least common multiple of `x` and `y`.

```
z = _______________;
```

2. (1 point) Fill in the blank in the snippet of the code given below such that it prints the pattern of stars as shown.

```
****
***
**
*
```

```
for (int i = 1; i <= 4; i++) {
    int j=1;
    do{
        printf("*"); j++;
    }
    while(j<=______);
    printf("\n");
}
```

3. (1 point) Consider a matrix `Mat` defined as follows: `short Mat[15][6];` If `Mat[0][0]` is stored at address 2008 and a *short* takes 2 byte of storage, the address of `Mat[12][3]` is : _____

4. (1 point) Suggest an initialization for the global variable g such that the program outputs 112.

```
#include<stdio.h>
int g = _____;
int f(int x) {
     x = 10;  g = g+2;
     return x+g;
}
void main() {
    printf("%d\n", f(g));
}
```

5. (2 points) Study the program given beside. For what input value of n does the program print **110** as result? Write a short explanation for your answer.

```
#include <stdio.h>
int main(void) {
    int n, i, result = 2;
    scanf("%d", &n);
    for (i=0; i<n; i++)
        result = result+4;
    printf("%d\n",result);
}
```

6. (2 points) The function given beside is an erroneous function to check whether the input string is a palindrome. Answer the following:

   - What is the output of the function (given as it is) for the call `palindrome("rotator")` ? Explain briefly.
   - Identify the error and correct it so that the function correctly detects palindromes.

```
1  void palindrome(char str[]){
2    int begin, end, count = 0;
3
4    while (str[count] != '\0')
5       count++;
6
7    begin = 0; end = count;
8
9    while (begin < end) {
10     if (str[begin] != str[end]) {
11       printf("%s is not palindrome", str);
12       return;
13     }
14     begin++; end--;
15   }
16   printf("%s is palindrome\n", str);
17 }
```

7. (2 points) Suggest an initialization for the integer array `A` of size 10 such that the output of the program given below is `2 2 2 2 2 2 2 2 2 2`
   Your initialization should ensure that **exactly two** array elements are initialized to 2.
   Give the initialization of the array clearly with 10 comma separated integer values.

```
#include<stdio.h>
main () {
    int A[10] = _________________;
    for (int i=0; i<10; i++) {
        printf("%d \t", A[A[i]]);
    }
}
```

8. (3 points) A natural number is said to be a palindrome if the sequence of its digits is the same whether read left to right or right to left. Given a natural number `n` the goal of the program is to output the **smallest palindrome larger** than or equal to `n`. Assume that the input integer `n` is at least three digit and does not contain the digit 0.

   Fill in the blanks to complete the program. The function `reverse` is supposed to return the reverse of the integer `x`.

```
 int reverse (int x) {
    int y = 0;
    while (x) {
        y = ______; x = x / 10;
    }
    return y;
}
void main() {
     int n; scanf ("%d", &n);
     while (_______) {
           ______;
     }
     printf("%d\n", n);
}
```

9. (3 points) In this problem we are interested in transposing a 3×3 integer `Matrix` **in place**. That is, after the execution of the program the variable `Matrix` contains the transpose of itself. The program uses a function `swap` which takes three inputs: a 3×3 `Matrix` and two integers `i` and `j`. The function swaps `Matrix[i][j]` with `Matrix[j][i]`.
Your goal is to fill in the blanks so that the program is complete. Provide the **prototype** of the function `swap`. Do NOT give the body of the function `swap`.

```
main() {
  int Matrix[3][3];
  // assume initialization for Matrix
  for (int i=0; i<3; i++) {
      for (int j=0; j<3; j++) {
          if (______)
              ----------;
          swap(Matrix, i, j);
      }
  }
}
```

10. (4 points) In this problem we are interested in checking whether the string `str` hits **all** the characters from `a, ..., z` **exactly once**. A character is said to be *hit* by a string if the character appears in the string. Note that `str` may contain characters other that `a, ..., z` as well. The program prints "Yes" if `str` satisfies the property given above, else it prints a "No".

    Fill in the blanks to complete the code for the problem. You cannot assume a specific ASCII value for the character 'a'. However it is known that the characters `a, ..., z` have contiguous ASCII values in that order.
    You can assume that the string input by the user contains less than 100 characters.

```
int countA[26] = {0};

char str[100];
scanf(________);

int i = 0;
while (str[i] != '\0') {
     if (__________) {
           int index = _________;
           countA[index]++;
     }
     i++;
}
int k;
for (k=0; k<26; k++) {
     if (___________) {
          printf("No\n");
          break;
     }
}
if (k == 26) printf ("Yes\n");
```

This is the end of the Question Paper.
Hope you enjoyed it.
