CSE108 – Computer Programming Laboratory

Lab #3

Date: March 6, 2020

Handin: A student with number 20180000001 should hand in a zip file named 20180000001.zip, which includes four files named `20180000001_part1.c`, `20180000001_part2.c`, `20180000001_part3.c` and `20180000001_part4.c` for this lab.

Part 1. [25pts] Write a complete program (in file <student_number>_part1.c) that takes two integers from the user and generate the multiplication table up to a range. The program should work as the following:

```
$ ./part1
Enter the first number:
3
Enter the second number:
4
3*1=3
3*2=6
3*3=9
3*4=12
```

Part 2. Write a complete program (in file <student_number>_part2.c) that takes an integer from the user and checks whether a entered number is perfect number.

Perfect number, a positive integer that is equal to the sum of its proper divisors.

Checking if the number entered by the user is a perfect number will be determined by a function, and this function will return "0" if the number is a perfect number and "1" if it is an integer value.

Function prototype is: `int is_perfect(int number)`

The program should work as the following:

```
$ ./part2
Enter the number:
6
6 is a perfect number!
```

Part 3. [25pts] Write a complete program (in file <student_number>_part3.c) that takes two integer from the user and calculates permutation and combination.

Mathematical formulas for permutation and combination calculation are given below.

$$P(M,N) = \frac{M!}{(M-N)!} \quad , \; C(M,N) = \frac{M!}{N!(M-N)!}$$

Each of the factorial, combination and permutation calculations will be calculated in separate functions.

Function prototype is for factorial : `int fact(int number)`
Function prototype is for combination : `int combination (int m, int n)`
Function prototype is for combination : `int permutation (int m, int n)`

Make sure that the M value is greater than or equal to the N value. If the values received from the user are not suitable, terminate the program by printed a message that the operation will not be possible.

The program should work as the following:

```
$ ./part3
Enter a number (M):
5
Enter a number (N):
3
C(5,3) = 10
P(5,3) = 60
```

Part 4. [25pts] Write a complete program (in file <student_number>_part4.c) that can check whether an integer entered by the user is a prime number or not and also can find Nth prime number. The following 2 options will be printed on the screen for the user to select at the beginning:

```
a. Is it prime or not
b. Nth prime number
```

After the user chooses one of the options, the operation will vary depending on his/her choice.

Please use the 'switch-case' structure!

- ***If the user chooses the option 'a',***

  Ask the user to enter a number and then find out if this number is a prime number or not via the function given below and terminate the program.

  Function prototype is : `int check_prime(int a)`

- ***If the user chooses the option 'b',***

  This time ask the user how many prime numbers he would like to list and list the prime numbers based on this number, in addition print the last line as "Nth. Prime number is ....." as shown below.

  When finding prime numbers here, assume that the maximum prime number is 997.

The program should work as the following:

```
For case : 'a' option
$ ./part4
a. Is it prime or not
b. Nth prime number
Please select the option from the menu :a
Enter a positive integer:85
85 is not a prime number.

For case : 'b' option
$ ./part4
a. Is it prime or not
b. Nth prime number
Please select the option from the menu :b
Enter an integer for N :4
1 . prime number : 2
2 . prime number : 3
3 . prime number : 5
4 . prime number : 7
4.th prime number is 7
```