Lab session (22nd Dec)

1. Easy

1.1. Write a program that declares an integer array `arr` of size 20. Use a `for`-loop to populate the `arr` with polynomials of degree 3. In particular, it should populate `arr[i]` with 3*i^3 + 2*i^2 + i + 42.

1.2. Write a program that declares two integer variables. Use scanf to read inputs into these two variables. Print the maximum and minimum of these integers.

1.3. Write a program to count the number of even and odd integers in an integer array. It should print only the number of even and odd integers as output.

1.4. Write a program that stores *"Hello World\n"* in a character array `str`. It then prints the string in reverse.

2. Normal

2.1. Write a program that inputs an integer n. It prints all the (exact integer) squares less than n.

- If input is 8, it prints (0, 1, 4). For input 19, it prints (0, 1, 4, 9, 16).
- Note: this can be done without using a nested for-loop.

2.2. Write a program that reads an integer n from the user and prints all composite numbers less than n.

- You will need nested for-loops for this program (loops of 2-dimension).

2.3. Write a program that declares two integer variables n1 and n2. Use scanf to read inputs into n1 and n2. Print the Fibonacci-Pingala numbers that are between n1 and n2. (in [n1, n2])

- The user may input 6, 9. The user may also input 9, 6. For both these inputs, the program should print only 8.

2.4. Write a program that reads an integer n from the user. Then, it populates the first n Fibonacci-Pingala numbers into any array FibPin. Then, it populates an array FibPinSq with the square of FibPin. Then, it prints out the pair (FibPin[i], FibPinSq) for all i.

3. Learn by Experiments

3.1. Assume that Fibonacci-Pingala numbers are stored in an integer (`int`) of 32 bits. What is the maximum value that can be stored (without overflow)?

- Do the same for 8 bit integers (`chars`) and 16 bit integers (`short`).

3.2. ***[Ramanujan Day Fun]*** 22nd December is the Birthday of the great Indian Mathematician Srinivasa Ramanujan. The number 1729 is well known to be Ramanujan number. It is the smallest number expressible as the sum of two cubes in two different ways. Write programs that do the following:

- Checks that 1729 indeed can be expressed as two cubes in two different ways by printing the two different ways.
- Checks that 1729 is the smallest number that can be expressed in this way. (No other number <= 1729 has this property.)
- Hint: storing the cubes of natural numbers in an array may simplify