High School Programming Competition
Computer Science Department, Saint Anselm College

Problem 1

First prime number. Write a program where the user enters a positive integer and the computer prints the first prime number greater than or equal to the user's input. *(A prime is a natural number that has exactly 2 distinct natural number divisors: 1 and itself)*
Input:
Enter a positive integer? 95
Output:
97

Problem 2

Rotate integers. Write a program that takes *n* integers and prints them in all possible rotation orders.
Input:
How many integers? 4
Input 4 integers? 5 2 0 4
Output:
5 2 0 4
2 0 4 5
0 4 5 2
4 5 2 0

Problem 3

Random students. Write a program where you enter n different student names and then ask the program to generate k random names out of the names you entered. Each time you run the program, the output should come up with a random sequence.
Input: Ask for n/// n=6
Enter name? Mary
Enter name? Ann
Enter name? Dan
Enter name? Jo
Enter name? Al
Enter name? Ray
Enter size of random group? 3
Output:
Mary Ann Ray (names do not repeat in a group)

Run again:
Ann Dan Al
Etc.

Problem 4

Poker. Check if *straight*. **Enter 5 integers between 1 and 13. The program should check if the numbers could be organized in consecutive order.**
Examples:
Input: Enter 5 cards? 4 6 5 3 7
Output: Yes. Straight.
Run again:
Input: Enter 5 cards? 4 6 12 3 7
Output: No.
Run again:
Input: Enter 5 cards? 89 6 12 3 7
Output: Error input.
Run again:
Input: Enter 5 cards? 11 10 12 13 9
Output: Yes. Straight.

Problem 5

Perfect cubes.   Write a program to find all the triplets (a, b, c) where a ,b and c are integers greater than 1 and less than or equal to 100, with the property that the sum of their cubes is a perfect cube.
$$a^3 + b^3 + c^3 = d^3$$

the program should display all triplets in ascending order without repetitions, that is the triplet (3 4 5) should occur only once (not (5 4 3) or (4 3 5) etc).
            d   a   b   c

Output:
            6   (3 4 5)
            12   (6 8 10)
            18   (2 12 16)
            …
            99   (11 66 88)
            100   (16 68 88)
            100   (35 70 85)