Assignment 3 (due 11 pm, Apr. 7, 2016)

Note:

a. Please write down handwriting part in HW3_ID.doc.
b. Create a directory HW3_ID to put HW3_ID, HW3_1_ID.cpp, HW3_2_ID.cpp
c. Zip the directory with name HW3_ID.zip for final submission
d. Incorrect formation files will not be graded.
e. You can check HW3_1_ID.cpp and HW3_2_ID.cpp in the test server before submission. The instruction of test server will be released later.
f. If you work with others for this assignment, please put their name in the HW3_ID.doc

Q1. Give a recursive algorithm to generate all m-element subsets of {1,...,n}.

Hint : This is to find all combinations out of n C(n,m).

Ex : C(4,1) = 4; C(4,2) = 6; C(4,3) = 4

Q2. Give an implementation of Q1 in C++, and give the filename : HW3_1_ID.cpp

Input (cin) : n, m, with $0 < m < n <= 24$

Ex :

4 2

Output (cout) : C(n,m)

Ex:

6

Q3. Give a recursive algorithm to find gcd(x,y) where x, y are integers

Hint : gcd(0,x) = x; gcd(0,y) = y; gcd(x,y) = gcd(y,x)

Hint : gcd(ay+b, y) = gcd (y,b) for a>0 and y > b

Hint: Euclidean algorithm

Q4. Give an implementation of Q3 in C++, and give the filename : HW3_2_ID.cpp

Input : x, y are random integers

Ex :

12 8

Output : gcd

Ex : 4

Q5. Give a recursive algorithm to solve the equation ax+by = c where a, b, c are given and x, y are unknown integers.

Q6. Given an implementation in C++ of Q5 (this is handwriting homework)

Input : x, y with $0 < x < y <= 30000$

Q7. Give a recursive algorithm to output all permutations of 1, …, n in lexicographical order.

Q8. Given an implementation in C++ of Q7 (this is handwriting homework)

Input : n with $0 < n <= 10$