Advanced Problem Solving: Assignment-1
Monsoon 2012
Deadline: August 24, 9pm (Indian Standard Time)

Instructions

1. Don't assume anything and adhere to specifications properly.
2. No extensions will be given under any circumstance.
3. Optimized code with proper error handling will be given higher credit.

Problems

1 . Given a natural number n (1 <= n <= 500000), output the summation of all its proper divisors. A proper divisor of a natural number is the divisor that is strictly less than the number. For example 20 has 5 proper divisors: 1, 2, 4, 5, 10, and the divisor summation is: 1 + 2 + 4 + 5 + 10 = 22.

Example:
Input: 20
Output: 22

2. Two numbers are relatively prime if their greatest common divisor is 1. For example, gcd(14, 15) =1. Given N and K as input, Write a program to print all the relative primes of all numbers from 3 to N which are less than K. K<=1000 & N<=1000. The input is format is: N<space>K

Example:
INPUT: 4 10
OUTPUT:
3 : 1, 2, 4, 5, 7, 8
4 : 1, 3, 5, 7, 9

3. Write a program to calculate the sum of digits of the expression 2^x where x is between 1 and 1000. The value of X is given as input. For example, 2^7=128, sum of digits=1+2+8=11 .

Example

INPUT: 7

OUTPUT: 11

4. Calculate the smallest number M divisible by all the numbers in a range from 1 to N where N<=30. For example, if N=4, the smallest number divisible by 1,2,3, and 4 is : 12. The value of N is given as input.

INPUT: 6

OUTPUT: 60

5. Find the combination of two numbers C(N,M) (number of combinations of M chosen from the set N). For example, N=5, M=2, then C(N,M)=$^5C_2$=10 . The input is format is: N<space>M. Value of N<=1000 . As the output can be large, print (output)mod (1000000007)

INPUT: 5 2

OUTPUT: 10

Instructions for submissions:

1. Name your programs as 1.c (if c program) or 1.cpp (if c++ program) for problem 1 and likewise for other problems.
2. Put all your programs in a folder and compress your folder to tar.gz file.
3. Upload your tar.gz file in the following format <RollNo>_<Firstname>_<branch>.tar.gz in the course portal.
4. Course portal will be closed after the deadline and no submissions after the deadline will be accepted.

Evaluation:

1. Evaluation will be scheduled later , where we will be manually evaluating your codes.