

ESC101 : Fundamental of Computing

Lab 6 for 10th September 2008

From this lab onwards, you will have to write JAVA programs which receive input from command-line (terminal). This was demonstrated during the lecture of 8th September.

1. Erdős–Borwein constant : (marks=10)

The Erdős–Borwein constant is a number calculated by the following formula:

$$E = \sum_{n=1}^{\infty} \frac{\sigma_0(n)}{2^n}$$

where $\sigma_0(n)$ is the number of divisors of n . e.g. $\sigma_0(12) = 6$, since the divisors of 12 are: 1, 2, 3, 4, 6, 12.

Write a JAVA program to find the approximate value of E , by calculating the first 30 terms of the above summation.

Programming hint: Write two methods:

`int noOfDivisors (int n)`: returns number of divisors of n .

`int power (int n, int k)`: returns n^k .

In the `main` method, declare a `double` variable `sum` and initialize it to 0. Call both of the above methods in a loop for each value of n to get each term of the `sum`.

2. Number of Relatively Prime Numbers less than n : (marks =10)

Two numbers a and b are said to be relatively prime (also called coprime) if $gcd(a, b) = 1$. For a given n , write a JAVA program to compute the number of coprimes less than n . For example, if $n = 9$, then the output should be 6 since the coprimes of 9 less than 9 are 1, 2, 4, 5, 7 and 8.

You should design and use a method called `gcd` which takes two integer arguments and returns their `gcd`.