

ESC101 : Fundamental of Computing

Lab 4 for 20th August 2008

1. Finding the value of e^x using Taylor series :

In mathematics, the Taylor series is a representation of a function as an infinite sum of terms. For more details, check http://en.wikipedia.org/wiki/Taylor_series.

The Taylor series for the exponential function e^x (at 0) is

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

Declare and initialize a `double` variable, `x`. Write a JAVA program to find the approximate value of e^x using the above series.

Print a table showing the value of e^x approximated by computing one term of the series, by computing two terms, by computing three terms and so on upto 10 terms.

Programming hint: Declare a `double` variable `sum` and initialize it to 0. Using a `for` loop, add each of the terms in the series to the variable `sum`. Note that the $(i+1)$ th term of the series can be computed by multiplying the i th term by $\frac{x}{i}$ and you don't need to calculate the numerator and denominator from scratch for each term in the series.

2. Coprime numbers:

Three integers a , b , and c are said to be *coprime* or *relatively prime* if they have no common factor other than 1 or, equivalently, if their *greatest common divisor* is 1.

For example, 12, 5 and 30 are coprime.

Declare and initialize three integer variables a, b , and c . Write a JAVA program to find whether a , b and c are coprime.

Programming hint: Use the GCD algorithm taught in class, and the simple fact that $GCD(a, b, c) = GCD(GCD(a, b), c)$.