PHYS 495 Problem Set 1

Date: Thursday, October 23^{rd}, 2003
Due date: Thursday, October 30^{th}, 2003

Instructions: Work should be submitted on or before due date, to the teaching assistant in source code form.

- **Problem 1** - Calculating e [40 points]

The base of natural logarithms, e can be expressed as an infinite sum as follows:

$$e = \frac{1}{0!} + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \frac{1}{4!} + \ldots$$

Write a console program in Java that calculates e using the first 1000 terms of this sum. Pay attention to the following points in order *not* to lose points:

- Make sure the program *compiles* and *works*.
- Make sure you store the calculated value of e as a `double`.
- You should *not* calculate factorials from scratch at every iteration.

- **Problem 2** - Perfect Numbers [60 points]

Perfect numbers are defined to be numbers which are equal to the sum of their proper divisors (excluding the number itself, and including 1). An example is 6. 6 has three proper divisors excluding itself; 1, 2, and 3. The sum of 1, 2, and 3 is 6, therefore 6 is a perfect number. Another example is 28. 28's proper divisors are 1, 2, 4, 7, 14. The sum of these numbers, is again, equal to 28.

Write a console program in Java that will find the first four[1] perfect numbers, including the ones given above as examples.

[1]The fifth perfect number is much larger than the first four. So make sure your program stops after finding and printing the first four perfect numbers.