ES 112.02/04 Homework #2
Fall 2003-2004

Calculating π

The ratio of the circumference of any circle to its diameter is a constant, known as π. There are numerous ways to calculate the value of the constant π, one formula (which converges rather slowly) is the following:

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \cdots$$

The Problem

Your task is to write a C program that calculates the value of the constant π with an absolute error that is less than 0.0001. The program should stop the calculation when the error becomes less than the given limit, and print the value of π as calculated.

Let π_c denote the calculated value, and π denote the exact value of the constant π. In this case, the absolute error, ϵ is defined to be:

$$\epsilon = |\pi_c - \pi|$$

In order to calculate the absolute error, you will need a "good" value for π. For this purpose, you can use 3.14159265358979323. You *may* also need the absolute value function. The absolute value function in C is `fabs(x)`, where `x` is a floating-point number. In order to use this function, you need to `#include` the header file `math.h` in your program.