Assignment 3

Let us agree that for numbers x and k, `x^k` is shorthand for "x raised to the kth power", e.g. 3^2 is 9.

Your program must print successive approximations to `pi/4`, using the approximation formula:

```
1 - 1/3 + 1/5 - 1/7 + 1/9 ... + ((-1)^n)/(2n+1)
```

where `n` is input by the user. Once a table of approximations has been printed, the program displays finally the value of `pi/4` as computed by `atan(1)`, where atan is a predefined function in the library `cmath`.

For example, for `n == 5`, the zeroth term of the approximation is

```
1
```

the first term of the approximation is

```
1 - 1/3
```

the second term of the approximation is

```
1 - 1/3 +1/5
```

and so on, for 6 terms (keeping in mind that the counting starts at 0).

The output is arranged in a table with a header row, as follows (using the example just given, with 3 (k term) pairs per line and n == 6) k term k term k term 0 1.000000 1 0.666667 2 0.866667 3 0.723810 4 0.834921 5 0.744012

The columns should be nicely spread out and aligned (use tabs); the number of (k term) pairs per line should allow for a compact display with no line running over into the next.

If `n == 72`, for example, the table will contain 73 (k term) pairs - after the header row, with 3 such pairs per line, the table will have 24 full lines, and then a final line with the last pair.

Numbers should be displayed with precisely 6 digits after the decimal point. This can be accomplished by using

```
cout.setf(ios::fixed);
cout.setf(ios::showpoint);
cout.precision(6);
```

The value of `pi/4` computed by `atan(1)` is displayed, with suitable identifying information, some nice number of lines below the bottom of the table.

The `atan` function is loaded from the `cmath` library: your program must use the header

```
#include <iostream>
#include <cmath>
using namespace std;
```

Try to make your program as efficient as you can.

Your specification need not repeat what I have written here, but it should clearly describe any differences between the job done by your program and what has been asked for.

Your code should include comments for the key variables, especially those used in the main loop.