Introduction to programming in C

In this assignment you will write a programme in C that calculates the squareroot of a positive real number with Newton-Raphson's method.

1. Calculate the squareroot of X

In this first part you will write a programme which besides the main function has a function called NR (Newton-Raphson method). Your programme should be divided so that the dialog with the user of the programme is done in the main function and so that the function NR calculates the squareroot of X with Newton-Raphson's method and returns the approximated value x_{N+1}.

Use the fact that the improved value of the squareroot X is

$$x_{n+1} = (x_n + \frac{X}{x_n})/2 \qquad n = 0, 1, 2 \ldots N$$

You need to assign an appropriate value to x_0. The error must be less than $1e-4$, where $error = |x_{N+1}^2 - X|$. You must use the data type float for the real number values!

When you are developing your programme it can be useful to use a variable for the number of iterations that is performed.

Example:

```
Calculate the squareroot of> 2
The squareroot of 2 is:
1.414
```

2. Calculate the squareroot of X and the error

Copy your programme into another file and modify it. Now update your code so your function NR returns the approximated value x_{N+1} AND the *error*. You must use the data type float for the real number values!

Example:

```
Calculate the squareroot of> 2
The squareroot of 2 is: 1.414
The error is: 0.00000596
```

3. Error ?

Now, change the *error* from $1e-4$ to $1e-9$ and run your programme. What happens? Why? How can one obtain the smaller error?