Problem 2

Given, a number X and we need to find square root of it.

Fixed-Point Iteration

$$x^2 = X \Rightarrow x = \frac{X}{x}$$

But, this function can keep oscillating in a loop.

Thus, we add damping in this operation by adding x to both the sides.

$$2x = \frac{X}{x} + x \Rightarrow x_{i+1} = 0.5 * \left(\frac{X}{x_i} + x_i\right)$$

Newton Method

$$x^2 = X \Rightarrow x^2 - X = 0 = f(x) \quad | \quad f'(x) = 2x$$

$$x_{i+1} = x_i - \frac{f(x_i)}{f'(x_i)}$$

The Output

```
>> [a, b] = T2_20110065(4, 1, 0.01)

a =

     2


b =

    2.0006

>> [a, b] = T2_20110065(4, 3, 0.01)

a =

     2


b =

    2.0064
```

```
>> [a, b] = T2_20110065(100, 3, 0.01)

a =

    10


b =

   10.0010

>> [a, b] = T2_20110065(100, 1, 0.01)

a =

    10


b =

   10.0326
```