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MATH 400-01
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Homework 02

4. $x^p = N$, $x_0 = 2$, 10^{-6}

Soln:

$x^p = N$

$\Rightarrow x^p - N = 0$

$\Rightarrow f(x) = x^p - N$

Hence: $f'(x) = p x^{p-1}$

Apply Newton's Method:

$$\Rightarrow x_{n+1} = x_n - \frac{x_n^p - N}{p x_n^{p-1}}$$

Apply them into code "question_04.py", we get 5 iterations.

$\therefore$ Therefore, I need 5 steps.

```
PS D:\Math\MATH 400> python -u "d:\Math\MATH 400\02_Homework\homework_02\question_04.py"
Number of iterations =  5
An estimate of the root is  1.4953487812212707
PS D:\Math\MATH 400>
```