1 Implementing a logarithm

Write a python program that will compute and print the value of $\log_{10}(2)$ with at least 6 digits of precision. Your program may not make any import statements or use any math functions, but may use the `**` operator in python, which would allow you, for instance to compute 10^x by writing `10**x`.

Note that the logarithm base 2 may be found by solving the equation

$$10^{\log_{10}(2)} = 2 \tag{1}$$

so you are looking for the number that when you take two that value gives you 10.

2 Solving for logarithm graphically

In this task, you will graphically solve the equation

$$10^x = 2 \tag{2}$$

which has a solution of $x = \log_{10}(2)$.

Write a python program that plots 10^x versus x. Add a horizontal line to this plot at a value of 2, and read off your plot the value of x at which your line and curve intersect. This value is $\log_{10}(2)$. Confirm this by adding a vertical line at $x = \log_{10}(2)$ (as computed by Python), and confirming that all three lines intersect at the same point. Your final program will create a plot with two lines and one curve, all intersecting.