In search of 0^0

Any number raise to 0 is 1.

But what if the number is 0 ? Like it by straight exponential theroem, it is 1

a^m /a^n = a^(m-n)

Here a being 0, dividing the same with 0 is undefined.

So let us make use of modern technologies like numpy, pandas to evaluate it further

```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns

#importing the libraries

np.arange(1,0,-0.01)  #making the list of numbers from 1 - 0

array([1.  , 0.99, 0.98, 0.97, 0.96, 0.95, 0.94, 0.93, 0.92, 0.91, 0.9 ,
       0.89, 0.88, 0.87, 0.86, 0.85, 0.84, 0.83, 0.82, 0.81, 0.8 , 0.79,
       0.78, 0.77, 0.76, 0.75, 0.74, 0.73, 0.72, 0.71, 0.7 , 0.69, 0.68,
       0.67, 0.66, 0.65, 0.64, 0.63, 0.62, 0.61, 0.6 , 0.59, 0.58, 0.57,
       0.56, 0.55, 0.54, 0.53, 0.52, 0.51, 0.5 , 0.49, 0.48, 0.47, 0.46,
       0.45, 0.44, 0.43, 0.42, 0.41, 0.4 , 0.39, 0.38, 0.37, 0.36, 0.35,
       0.34, 0.33, 0.32, 0.31, 0.3 , 0.29, 0.28, 0.27, 0.26, 0.25, 0.24,
       0.23, 0.22, 0.21, 0.2 , 0.19, 0.18, 0.17, 0.16, 0.15, 0.14, 0.13,
       0.12, 0.11, 0.1 , 0.09, 0.08, 0.07, 0.06, 0.05, 0.04, 0.03, 0.02,
       0.01])

lst=[]
```

```
for i in np.round(np.arange(1,0,-0.001),3):
    lst.append(i)

lst

[1.0,
 0.999,
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 0.006,
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 0.004,
 0.003,
 0.002,
 0.001]

lst_pow=[]
for i in lst:
    lst_pow.append(np.power(i,i))      #making the power of each number
we created in the list to that number

lst_pow

[1.0,
 0.9990009995003333,
 0.9980039960053306,
 0.9970089865269798,
 0.9960159680852483,
 0.9950249377080741,
 0.9940358924313555,
 0.9930488292989416,
 0.9920637453626223,
 0.9910806376821192,
 0.9900995033250751,
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 0.9871679109897548,
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Preparing the dataframe with the result obtained

```python
pd.set_option('display.precision', 15)
pd.set_option('display.float_format', lambda x: f'{x:.15f}')
df=pd.DataFrame({'x':lst,'x^x':lst_pow})
print(df.to_string(index=False))
```

```
               x                 x^x
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0.999000000000000 0.999000999500333
0.998000000000000 0.998003996005331
0.997000000000000 0.997008986526980
0.996000000000000 0.996015968085248
0.995000000000000 0.995024937708074
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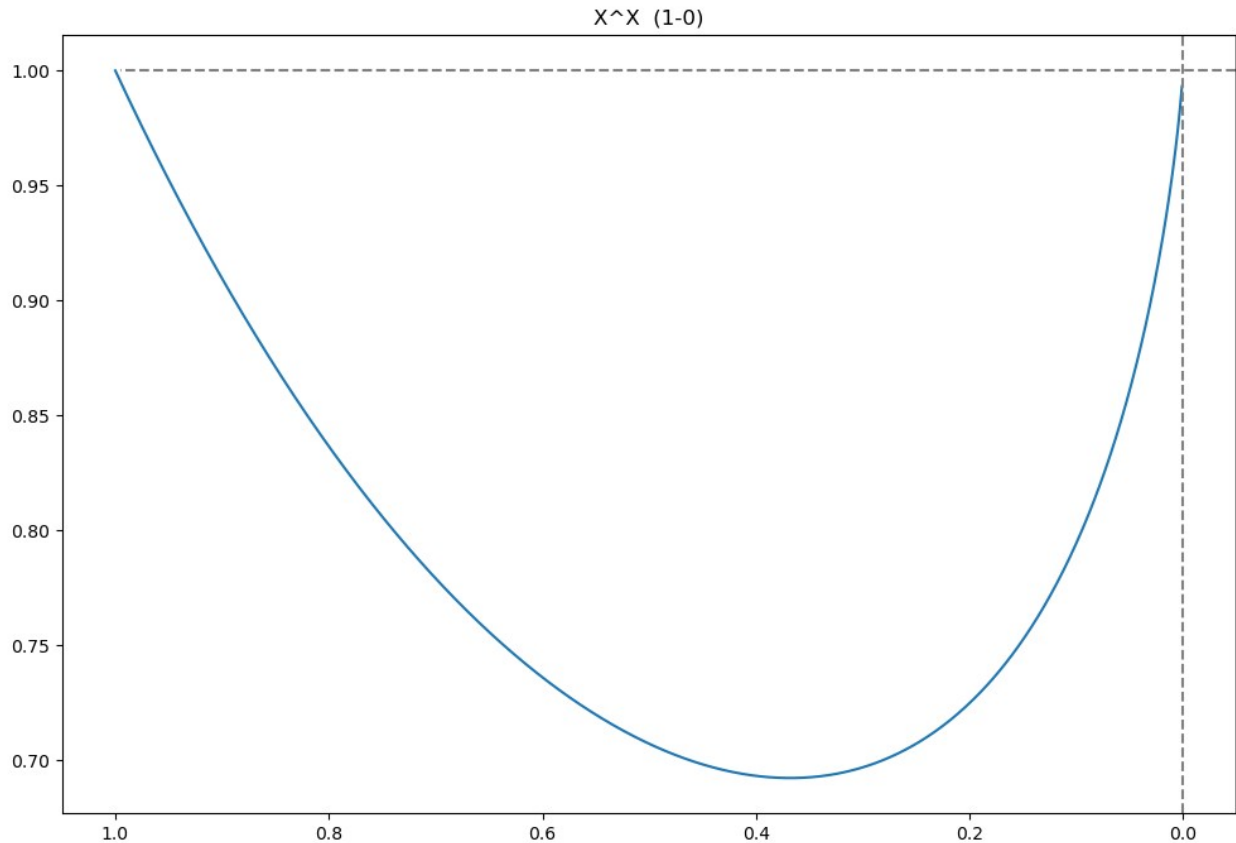
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## Plotting the graph to get an intutive approach

plt.figure(figsize=(12,8))
plt.plot(lst,lst_pow)
plt.gca().invert_xaxis()
plt.axhline(y=1, xmin=1, xmax=0.05, linestyle='--', color='gray')
plt.axvline(x=0, ymin=0, ymax=1, linestyle='--', color='gray')
plt.title("X^X  (1-0)")
plt.savefig("x_pow_x_plot.jpg", bbox_inches='tight')
plt.show()
```

X^X (1-0)

Conclusion:

As you can the curve starts high, dips down and then shoots.

It is like it nears the value 1 but never reaches 1.

0^0 is undefined in mathematics, but in most programming environments like NumPy, it is defined as 1 for computational convenience.