In [1]:

```
from math import exp
import matplotlib
import matplotlib.pyplot as plt
import numpy as np


def function1(x):
    k = 0
    a = 1 * pow(x, 2 * (k + 1)) / 1.
    s = a
    print('%.2Lf\t%8.2Lf\t%8.2Lf' % (x, a, s))
    while k < 500:
        if k == 0:
            print('a0 = %e\tS0 =%.2f\n' % (a, s))
        k = k + 1
        a = a * 1 * x * x / ((2 * k) * (2 * k + 1))
        s = s + a
        if k == 499:
            print('a499 = %Le\tS499 =%.2Lf\n' % (a, s))

    print('a500 = %e\tS500 =%.2f\n' % (a, s))


def function2(x):
    k = 0
    a = 1 * pow(x, 2 * (k + 1)) / 1.
    s = 0
    s = a
    while k < 500:
        k = k + 1
        a = a * x / k;
        s = s + a
    return s


x = float(input('Enter Value For X: '))
y = np.sinh(x)

print("y = sinh(" + str(x) + ") = " + str(y))

function1(x)

print('\n')
print('\t\t  500')
print('\t\t----')
print('\t\t\\\t\t\t     2(n)+1')
print('\t\t \\\t\t\t (x)')
print('sinh(x)= |\t    ----------------------')
print('\t\t /\t\t\t   (2(n)+1)!')
print('\t\t/')
print('\t\t----')
print('\t\tk=0')

print('\n')
print('\t\t\tx')
print('R=\t\t ---------')
print('\t\t\tk')

x = np.arange(-10, 10, 0.01)
```

```
y = np.sinh(x)
yy = function2(x)

ax1 = plt.subplot(121)
ax1.set_ylim([-16000, 16000])
plt.plot(x, y, )
plt.xlabel('X-AXIS')
plt.ylabel('Y-AXIS')
plt.title('TAYLOR SERIES')
plt.grid()
plt.show()
```

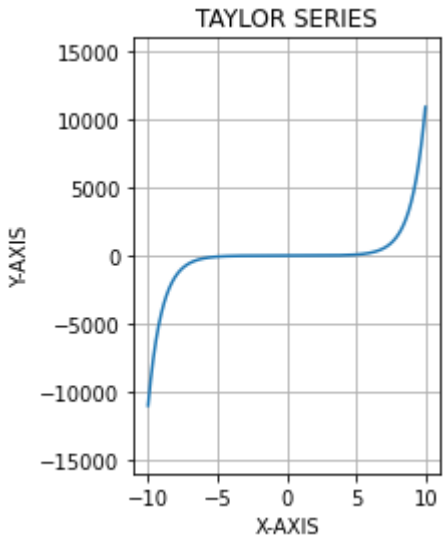
```
Enter Value For X: 2.05
y = sinh(2.05) = 3.819583101359483
2.05        4.20            4.20
a0 = 4.202500e+00       S0 =4.20

a499 = 0.000000e+00     S499 =7.83

a500 = 0.000000e+00     S500 =7.83
```

$$\sinh(x) = \sum_{k=0}^{500} \frac{x^{2(n)+1}}{(2(n)+1)!}$$

$$R = \frac{x}{k}$$



In [ ]: