Actividad en clase

Series de Taylor

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```
from typing import Callable
import sympy as sym
from IPython.display import display
def taylor_approx(*, fcn: Callable[[float],float], x0: float, n: int) -
    x = sym.symbols("x")
    f = sym.sympify(fcn(x))
    taylor: sym.Symbol = 0
    for i in range (n + 1):
        taylor += f.diff(x,i).subs(x, x0)/sym.factorial(i) * (x - x0) *
        display(taylor)

    return taylor

taylor_approx(fcn = lambda x:1/x, x0=1, n=4)
```

1

$2 - x$

$-x + (x - 1)^{2} + 2$

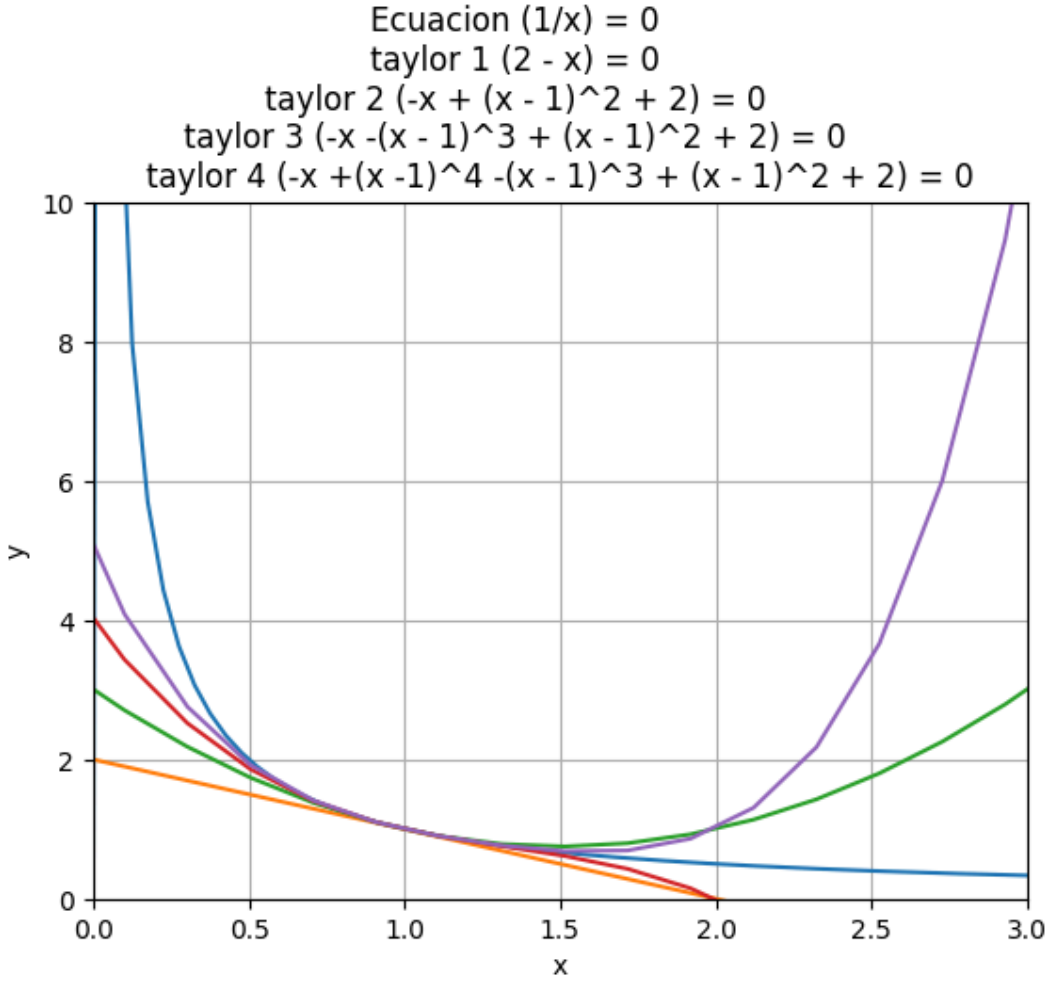
$-x - (x - 1)^{3} + (x - 1)^{2} + 2$

$-x + (x - 1)^{4} - (x - 1)^{3} + (x - 1)^{2} + 2$

$-x + (x - 1)^{4} - (x - 1)^{3} + (x - 1)^{2} + 2$

```
import numpy as np

import matplotlib.pyplot as plt

def equation(x:float)->float:
    return (1/x)

def equation1(x:float)->float:
    return (2 - x)

def equation2(x:float)->float:
    return (-x + (x - 1)**2 + 2)

def equation3(x:float)->float:
    return (-x-(x - 1)**3 + (x - 1)**2 + 2)

def equation4(x:float)->float:
```

```
    return (-x +(x -1)**4 -(x - 1)**3 + (x - 1)**2 + 2)

# Generate x values
x = np.linspace(-10, 10, 400)

# Calculate y values
y = equation(x)

# Plot the equation
plt.plot(x, y)

x1 = np.linspace(-10, 10, 200)
y1 = equation1(x1)

plt.plot(x1, y1)

x2 = np.linspace(-10, 10, 100)
y2 = equation2(x2)

plt.plot(x2, y2)

x3 = np.linspace(-10, 10, 100)
y3 = equation3(x3)

plt.plot(x3, y3)

x4 = np.linspace(-10, 10, 100)
y4 = equation4(x4)

plt.plot(x4, y4)

plt.xlabel('x')
plt.ylabel('y')
plt.title('Ecuacion (1/x) = 0\
          \ntaylor 1 (2 - x) = 0\
          \ntaylor 2 (-x + (x - 1)^2 + 2) = 0\
          \ntaylor 3 (-x -(x - 1)^3 + (x - 1)^2 + 2) = 0\
          \ntaylor 4 (-x +(x -1)^4 -(x - 1)^3 + (x - 1)^2 + 2) = 0')
ax = plt.gca()
ax.set_ylim([0, 10])
ax.set_xlim([0.0, 3])
plt.grid(True)
plt.show()
```


Ecuacion (1/x) = 0
taylor 1 (2 - x) = 0
taylor 2 (-x + (x - 1)^2 + 2) = 0
taylor 3 (-x -(x - 1)^3 + (x - 1)^2 + 2) = 0
taylor 4 (-x +(x -1)^4 -(x - 1)^3 + (x - 1)^2 + 2) = 0
10
8
6
4
2
0
y
0.0
0.5
1.0
1.5
2.0
2.5
3.0
x