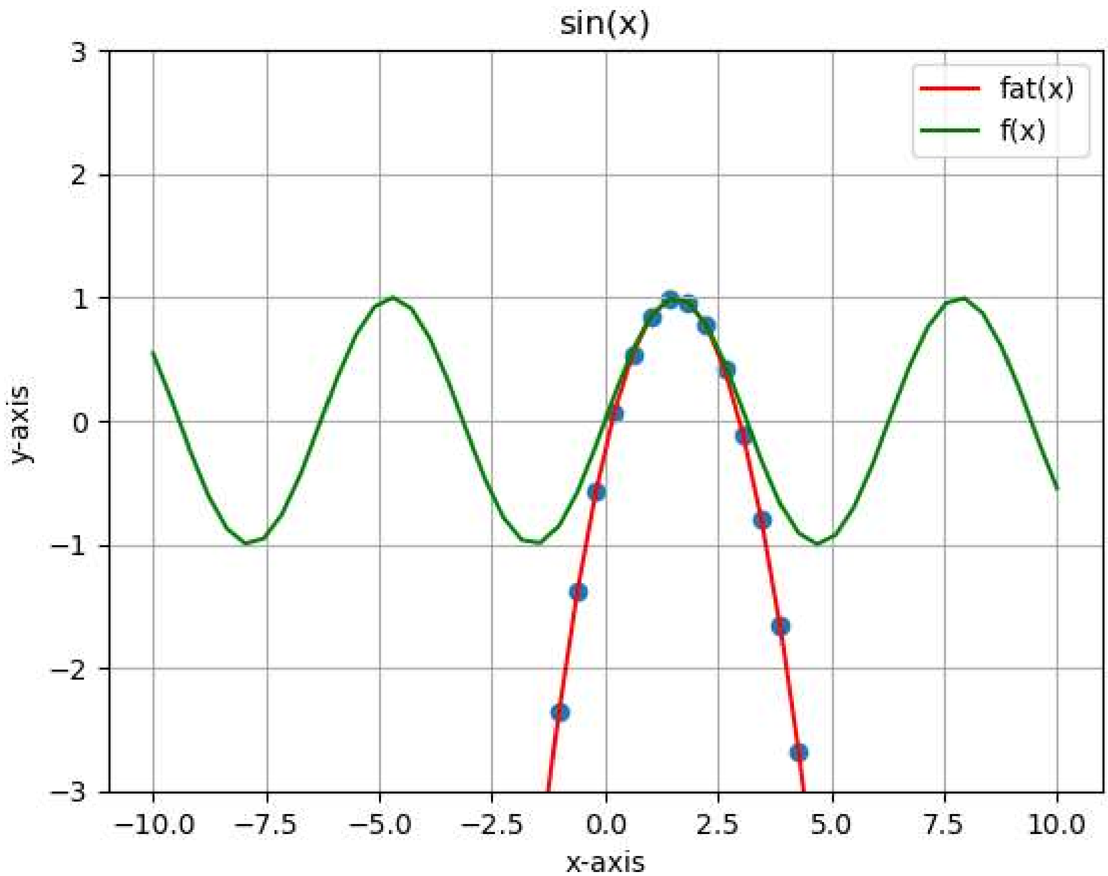
Expand sin(x) as Taylor series about x = pi/2 upto 3rd degree term.

In [1]:

```
import numpy as np
import matplotlib.pyplot as plt
from sympy import *
x=symbols('x')
f=sin(x)
a= float(pi/2)
df= diff(f , x)
d2f = diff(f ,x , 2)
d3f = diff(f ,x , 3)
fat = lambdify(x , f)
dfat = lambdify(x , df)
d2fat = lambdify(x , d2f)
d3fat = lambdify(x , d3f)
f=fat(a)+((x-a)/factorial(1))*dfat(a)+((x-a)**2/factorial(2))*d2fat(a)+((x-a)**
display(simplify(f))
fat = lambdify(x,f)

def f(x):
    return np.sin(x)
x=np.linspace(-10,10)
plt.plot(x, fat(x), color='red',label='fat(x)')
plt.plot(x, f(x), color='green',label='f(x)')
plt.ylim([-3 , 3])
plt.title('sin(x)')
plt.xlabel('x-axis')
plt.ylabel('y-axis')
plt.scatter(x, fat(x))
plt.legend()
plt.grid()
plt.show()
```

$$-1.02053899928946 \cdot 10^{-17} x^3 - 0.5x^2 + 1.5707963267949x - 0.23370055013617$$



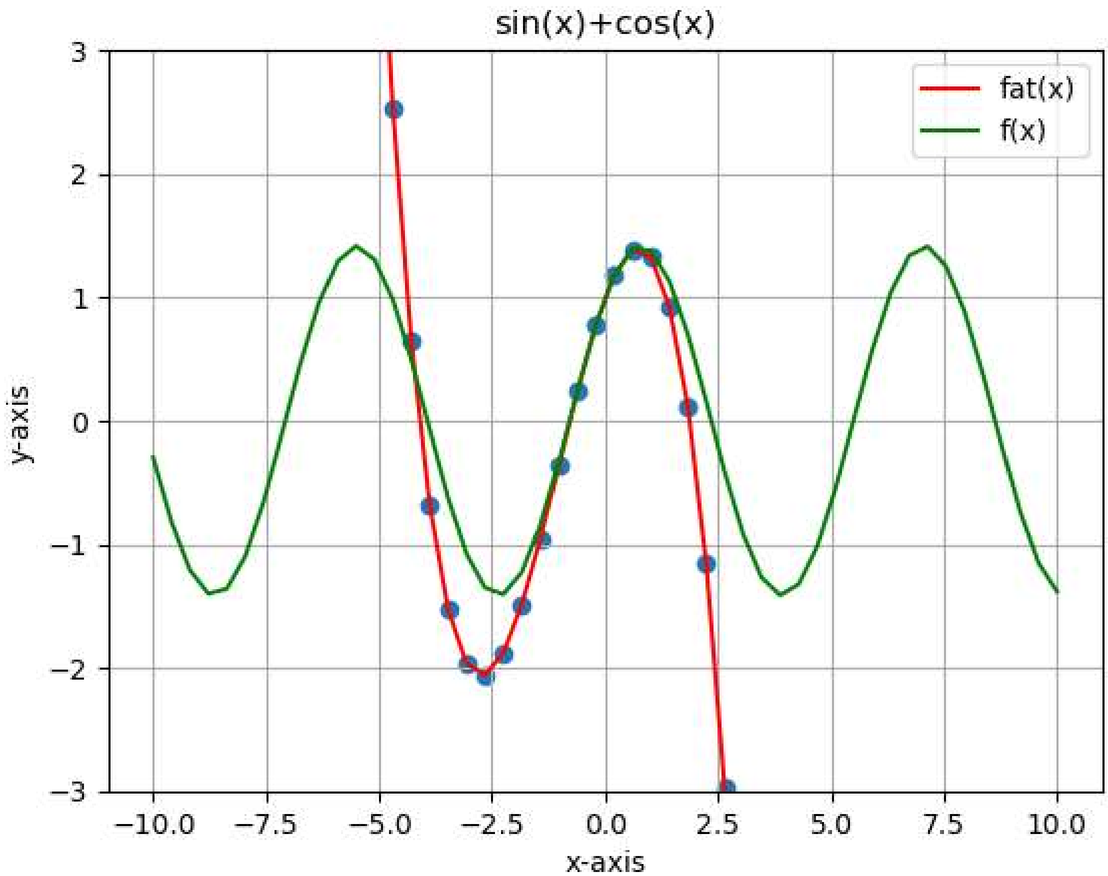
Find the Maclaurin series expansion of sin(x)+ cos(x) upto 3rd degree term.

In [2]:

```
import numpy as np
import matplotlib.pyplot as plt
from sympy import *
x=symbols('x')
f=sin(x)+cos(x)
a=0
df= diff(f , x)
d2f = diff(f ,x , 2)
d3f = diff(f ,x , 3)
fat = lambdify(x , f)
dfat = lambdify(x , df)
d2fat = lambdify(x , d2f)
d3fat = lambdify(x , d3f )
f=fat(a)+((x-a)/factorial(1))*dfat(a)+((x-a)**2/factorial(2))*d2fat(a)+((x-a)**
display(simplify(f))
fat = lambdify(x,f)

def f(x):
    return np.sin (x)+np.cos(x)
x=np.linspace(-10,10)
plt.plot(x, fat(x), color='red',label='fat(x)')
plt.plot(x, f(x), color='green',label='f(x)')
plt.ylim([-3 , 3])
plt.title('sin(x)+cos(x)')
plt.xlabel('x-axis')
plt.ylabel('y-axis')
plt.scatter(x, fat(x))
plt.legend()
plt.grid()
plt.show()
```

$$-0.166666666666667x^3 - 0.5x^2 + 1.0x + 1.0$$


sin(x)+cos(x)
fat(x)
f(x)
y-axis
x-axis
3
2
1
0
−1
−2
−3
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5
10.0