In [11]:
```
import numpy as np
import matplotlib.pyplot as plt

plt.style.use('seaborn-poster')
```

```
C:\Users\Akshay\AppData\Local\Temp\ipykernel_38068\1421859367.py:4: MatplotlibDeprecationWarning: The seaborn styles shipped by Matplotlib are deprecated since 3.6, as they no longer correspond to the styles shipped by seaborn. However, they will remain available as 'seaborn-v0_8-<style>'. Alternatively, directly use the seaborn API instead.
  plt.style.use('seaborn-poster')
```

TD - 1 :

Recall that the Taylor series of $\sin x$ centered at $x = 0$ is

$$\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots$$

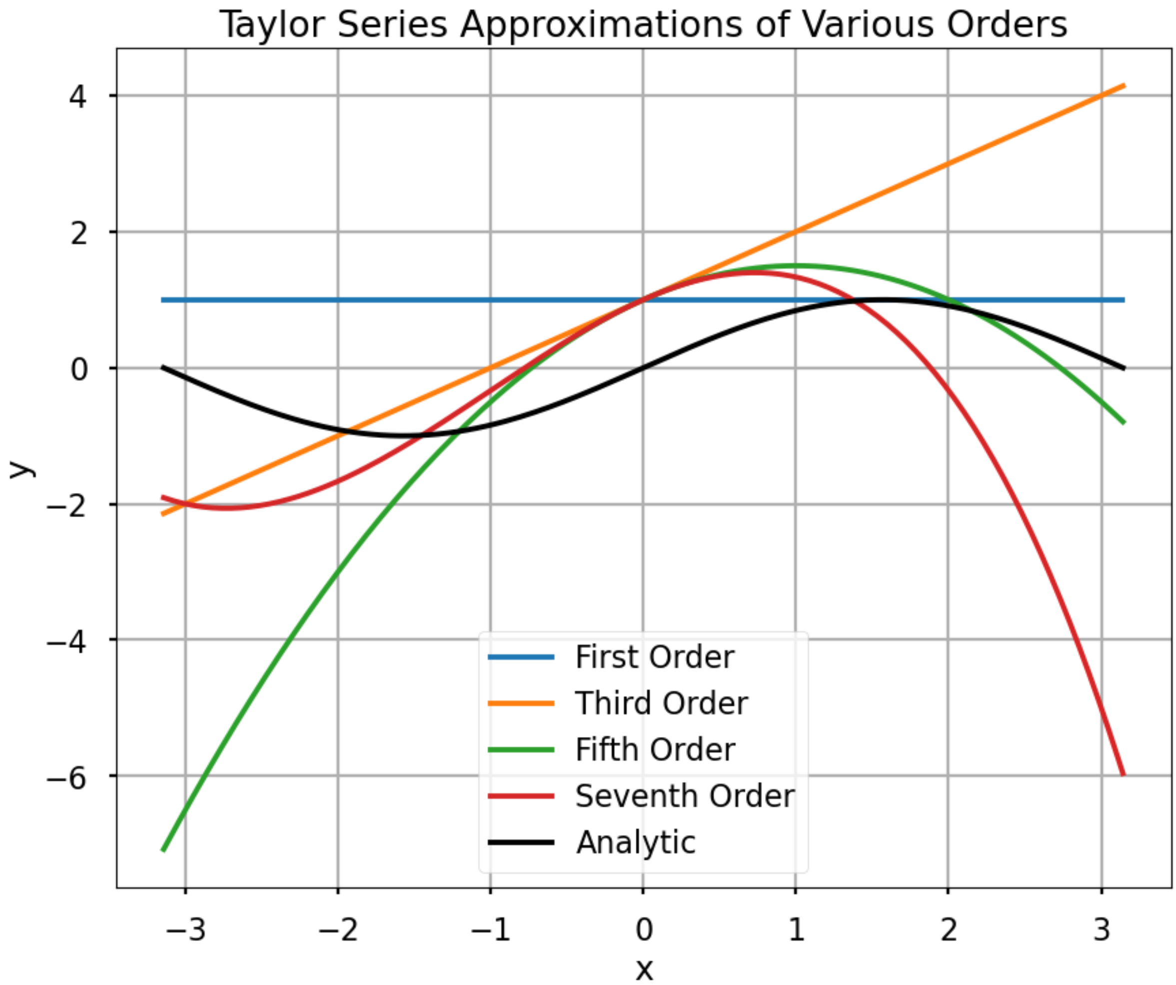
Implement this equation (*in one line*) below. [Hint : Use np.math.factorial() for the factorial function.]

In [12]:
```
x = np.linspace(-np.pi, np.pi, 200)
y = np.zeros(len(x))

labels = ['First Order', 'Third Order', 'Fifth Order', 'Seventh Order']

plt.figure(figsize = (10,8))
for n, label in zip(range(4), labels):
    y = y + ((-1) ** (n // 2)) * (x ** n) / np.math.factorial(n) #Implement the Tay
    plt.plot(x,y, label = label)

plt.plot(x, np.sin(x), 'k', label = 'Analytic')
plt.grid()
plt.title('Taylor Series Approximations of Various Orders')
plt.xlabel('x')
plt.ylabel('y')
plt.legend()
plt.show()
```



Now test the value of the Taylor approximation of $\sin x$ at $x = 0$ and $x = \frac{\pi}{2}$:

In [13]:
```
x = np.pi/2
y = 0

for n in range(4):
    y = y + ((-1) ** n) * (x ** (2 * n + 1)) / np.math.factorial(2 * n + 1) #Write

print(y)
```

```
0.9998431013994987
```

In [ ]: