

```
In [5]: import numpy as np
import matplotlib.pyplot as plt
```

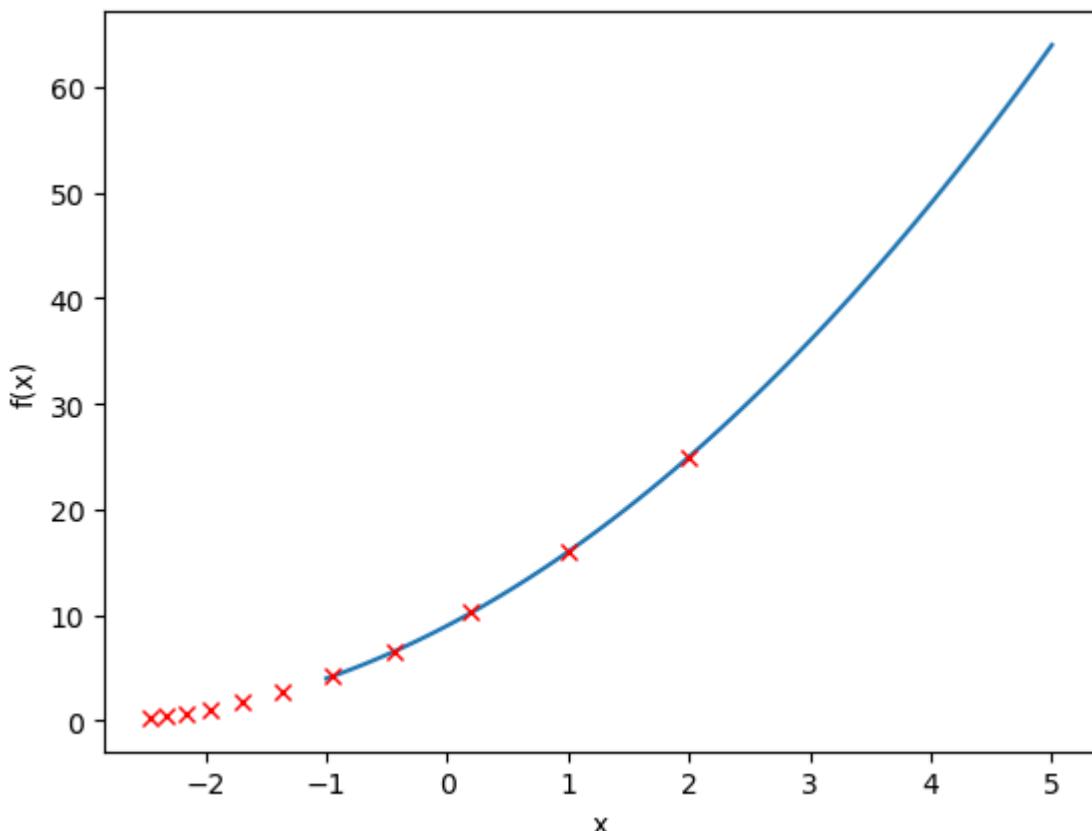
```
In [7]: def f(x):
    return x**2+6*x+9
def df(x):
    return 2*x+6
```

```
In [9]: def gradient(initial_x,learning_rate,num_iterations):
    x=initial_x
    x_history=[x]
    for i in range(num_iterations):
        gradient=df(x)
        x=x-learning_rate*gradient
        x_history.append(x)
    return x,x_history
```

```
In [13]: initial_x=2
learning_rate=0.1
num_iterations=10
x,x_history=gradient(initial_x, learning_rate, num_iterations)
print('Local Minima', x)
```

Local Minima -2.463129088

```
In [23]: x_vals=np.linspace(-1,5,100)
plt.plot(x_vals,f(x_vals))
plt.plot(x_history,f(np.array(x_history)), 'rx')
plt.xlabel('x')
plt.ylabel('f(x)')
plt.show()
```



In []: