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BE A Computer

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Implement Gradient Descent Algorithm to find the local minima of a function. For example, find the local minima of the function $y=(x+3)^2$ starting from the point $x=2$.

In [1]:
```
import matplotlib.pyplot as plt
import numpy as np
```

In [ ]:
```
# Gradient Descent Algorithm to find the local minima of
# the function y = (x + 3)^2

# Define the function and its derivative
def given_function(x):
    return (x + 3) ** 2

def derivative(x):
    return 2 * (x + 3)
```

In [ ]:
```
def gradient_descent(function, start, learn_rate, n_iter = 100,
                     tolerance = 0.1):
    gradient = derivative
    function = given_function
    points = [start]
    iters = 0

    while iters < n_iter:
        prev_x = start
        start = start - learn_rate * gradient(prev_x)
        iters = iters+1
        points.append(start)
    print("The local minimum occurs at", start)

    x_ = np.linspace(-7, 5, 100)
    y = function(x_)

    fig = plt.figure(figsize = (10, 10))
    plt.plot(x_, y, 'g')
    plt.plot(points, function(np.array(points)), '-o')

    plt.show()
```

In [ ]:
```
gradient_descent(function = given_function, start = 2.0, learn_rate = 0.2,
                 n_iter = 50)
```

```
The local minimum occurs at -2.999999999959586
```