Assignment 11

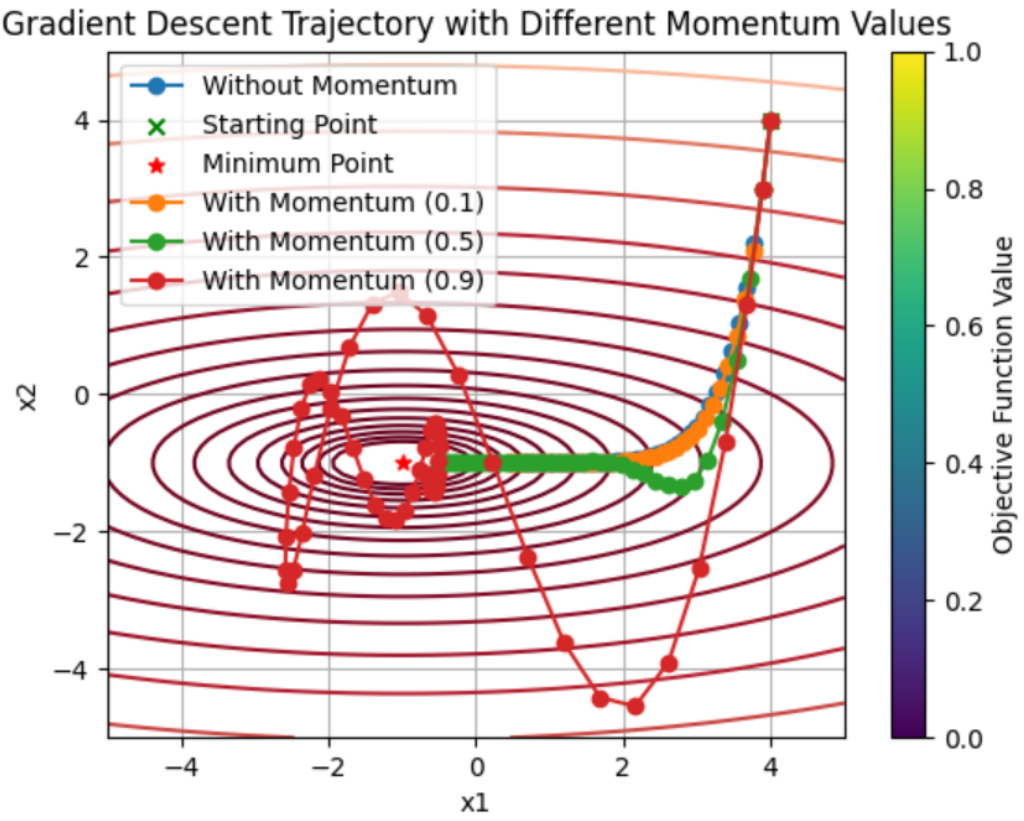
Task1

Test1:

Minimize f(x)= $(x_1+1)^2/9 + (x_2+1)^2$.

initial point (4,4)

learning_rate = 0.1



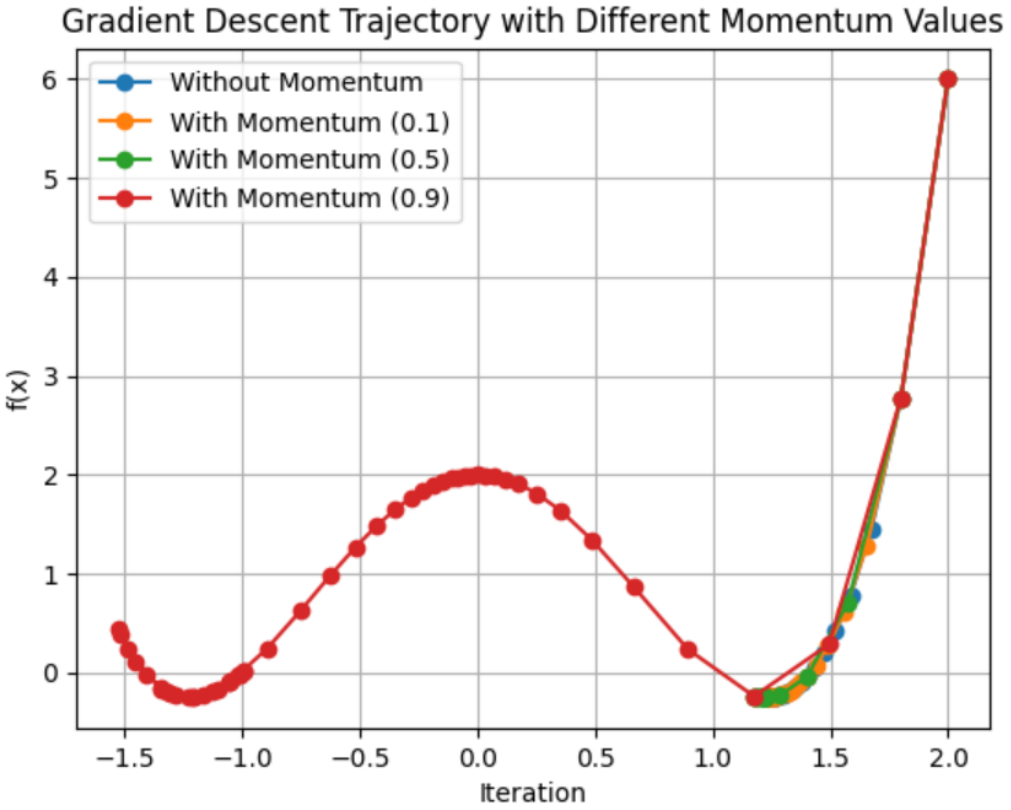
Test2:

Minimize

$$f(x) = x^4 - 3x^2 + 2$$

init_point = 2

learning_rate = 0.01



Conclusion:

Positive Effects:

1. **Acceleration of Convergence:** Larger momentum values typically accelerate the convergence of the gradient descent algorithm, especially in regions of steep slopes on the function surface.
2. **Escape from Local Optima:** Appropriate momentum values help the gradient descent algorithm escape from local optima, thereby increasing the likelihood of converging to the global optimum.

Negative Effects:

1. **Overshooting Optima:** Excessive momentum values may cause the gradient descent algorithm to overshoot local or global optima, preventing convergence.
2. **Increased Instability:** Excessive momentum values can lead to instability and oscillations during the convergence process, causing the optimization process to lose control.