Do backpropagation, compute loss, and optimize parameters of the following functions for 5 steps (iterations):

*W*3x + 4b; gt = 12; W=-2, b=2, x=1;*

*W*5x + 2b; gt = 10; W=4, b=-3, x=-1;*

*W*4x - b; gt = 15; W=5, b=-1, x=2;*

*W*x + 3b; gt = 20; W=6, b=1, x=2;*

*W*7x - 4b; gt = 29; W=15, b=10, x=-2;*

W * 4x - b; gt = 15; W = 5 ; b = -1 ; x = 2 ;

Prediction : W * 4x - b = 41

Iteration #1 :

MeanSquaredError : (prediction - gt) ** 2 = 676

Prediction : 41 Loss : 676

Optimization step :

w1 = w0 - alpha * w0.grad(from backpropagation) = 5 - 0.1 * (40) = 1

w1 = 1

Optimization step :

b1 = b0 - alpha * b0.grad(from backpropagation) = -1 - 0.1 * (-10) = 0

b1 = 0

Iteration #2 :

MeanSquaredError : (prediction - gt) ** 2 = 4

Prediction : 8 Loss : 49

Optimization step :

w1 = w0 - alpha * w0.grad(from backpropagation) = 1 - 0.1 (-10) = 2

w1 = 2

Optimization step :

b1 = b0 - alpha * b0.grad(from backpropagation) = 0 - 0.1 * (-20) = 2

b1 = 2

Iteration #3 :

MeanSquaredError : (prediction - gt) ** 2 = 244

Prediction : 16 Loss : 244

w * 7x - 4b ; gt = 29 ; W = 15 ; b = 10 ; x = -2 ;

Prediction :

w * 7x - 4b => 15 * 7 * (-2) - 4*10 = -250

Iteration #1 :

MeanSquaredError : (prediction - gt) ** 2 = (-250 - 29) ** 2 = 77,841

Prediction : -250 Loss : 77,841

Optimization step :

w1 = w0 - alpha * w0.grad(from backpropagation)

w1 = 15 -0.1*170 = -2

Optimization step :

b1 = b0 - alpha * b0.grad(from backpropagation)

b1 = 10 - 0.1 * 100 = 0

MeanSquaredError : (prediction - gt) ** 2 = (28 - 29) ** 2 = 1

Prediction : 28 Loss : 1

w * 3x + 4b ; gt = 12 ; W = -2 ; b = 2 ; x = 1 ;

Prediction :

w * 7x - 4b => 2

Iteration #1 :

MeanSquaredError : (prediction - gt) ** 2 = 100

Prediction : 2 Loss : 100

Optimization step :

w1 = w0 - alpha * w0.grad(from backpropagation) = -2 - 0.1 * (-70) = 5

w1 = 5

Optimization step :

b1 = b0 - alpha * b0.grad(from backpropagation) = 2 - 0.1 * 30 = 1

b1 = -1

Iteration #2 :

MeanSquaredError : (prediction - gt) ** 2 = 1

Prediction : 11 Loss : 1

w * 5x + 2b ; gt = 10; W = 4 ; b = -3 ; x = -1 ;

Prediction :

w * 5x + 2b = -26

Iteration #1 :

MeanSquaredError : (prediction - gt) ** 2 = 1296

Prediction : -26 Loss : 1296

Optimization step :

w1 = w0 - alpha * w0.grad(from backpropagation) = 4 - 0.1 * 40 = 0

w1 = 0

Optimization step :

b1 = b0 - alpha * b0.grad(from backpropagation) = -3 + 0.1 * 70 = 4

b1 = 4

Iteration #2 :

MeanSquaredError : (prediction - gt) ** 2 = 4

Prediction : 8 Loss : 4

w * x + 3b ; gt = 10; W = 4 ; b = -3 ; x = 2;

Prediction :

w * x + 3b = 15

Iteration #1 :

MeanSquaredError : (prediction - gt) ** 2 = 25

Prediction : 15 Loss : 25

Optimization step :

w1 = w0 - alpha * w0.grad(from backpropagation) = 6 - 0.1 * 10 = 5

w1 = 5

Optimization step :

b1 = b0 - alpha * b0.grad(from backpropagation) = 1 - 0.1 * (-20) = 3

b1 = 3

Iteration #2 :

MeanSquaredError : (prediction - gt) ** 2 = 1

Prediction : 19 Loss : 1