X_1	X_2	D
2	3	1
5	4	0
1	5	1

By using perceptron (single neuron) method, find the weights of neuron model after the first iteration only. (Note: we can accept the initial values of all weights (also theta) as zero, and learning rate is 0.5)

w1=0
w2=0
b=0
Q=0
eta=0.5

compute net1 (for the first sample 2,3:1)
net1=2*0+3*0+0=0
y1 = 0 but since d1=1 e1=d1-y1=1
Dw1=0.5*1*2=1 → w1=w1+Dw1=0+1=1
Dw2=0.5*1*3=1.5 → w2=w2+Dw2=0+1.5=1.5
Db=0.5*1 = 0.5 → b=b+Db=0+0.5 = 0.5

compute net2 (for the second sample 5,4:0)
net2=5*1+4*1.5+0.5=11.5
y2 = 1 but since d2=0 e2=d2-y2=-1
Dw1=0.5*-1*5=-2.5 → w1=w1+Dw1=1-2.5=-1.5
Dw2=0.5*-1*4=-2 → w2=w2+Dw2=1.5-2=-0.5
Db=0.5*-1 = -0.5 → b=b+Db=0.5-0.5 = 0

compute net3 (for the third sample 1,5:1)
net3=1*-1.5+5*-0.5+0=-4
y3 = 0 but since d3=1 e3=d3-y3=1
Dw1=0.5*1*1=0.5 → w1=w1+Dw1=-1.5+0.5=-1
Dw2=0.5*1*5=2.5 → w2=w2+Dw2=-0.5+2.5=2
Db=0.5*1 = 0.5 → b=b+Db=0 +0.5 = 0.5

w1=-1 w2=2 b=0.5

In order to find MSE,
compute net1 (for the first sample 2,3:1)
net1=2*w1+3*w2+b=4.5 y1 = 1 since d1=1 e1=d1-y1=0
compute net2 (for the second sample 5,4:0)
net2=5*w1+4*w2+b=3.5 y2 = 1 since d2=0 e2=d2-y2=-1
compute net3 (for the third sample 1,5:1)
net3=1*w1+5*w2+b=9.5 y3 = 1 since d3=1 e3=d3-y3=0

MSE = $(0^2+(-1)^2+0^2)/3=0.33$

By using adaline (single neuron) method, find the weights of neuron model after the first iteration only. (Note: we can accept the initial values of all weights (also theta) as zero, and learning rate is 0.5)

w1=1
w2=-1
b=0
eta=0.5

compute net1 (for the first sample 2,3:1)
net1=2*1+3*-1+0=-1
y1 = 0 since d1=1 e1=d1-net1=1-(-1)=2
Dw1=0.5*2*2=2 → w1=w1+Dw1=1+2=3
Dw2=0.5*2*3=3 → w2= -1+3=2
Db=0.5*2 = 1 → b=0+1=1

compute net2 (for the second sample 5,4:0)
net2=5*3+4*2+1=24
y2 = 1 but since d2=0 e2=d2-net2=0-24=-24
Dw1=0.5*(-24)*5=-60 → w1= 3-60=-57
Dw2=0.5*(-24)*4=-48 → w2= 2-48=-46
Db=0.5*(-24) = -12 → b=1-12=-11

compute net3 (for the third sample 1,5:1)
net3=1*(-57)+5*(-46)-11=-298
y3 = 0 since d3=1 e3=d3-net3=1-298=-297
Dw1=0.5*(-297)*1=-148.5 → w1= -57-148.5=-205.5
Dw2=0.5*(-297)*5=-742.5 → w2= -46-742.5=-788.5
Db=0.5*(-297) = -148.5 → b=-11-148.5=-159.5

w1=-205.5 w2=-788.5 b=-159.5