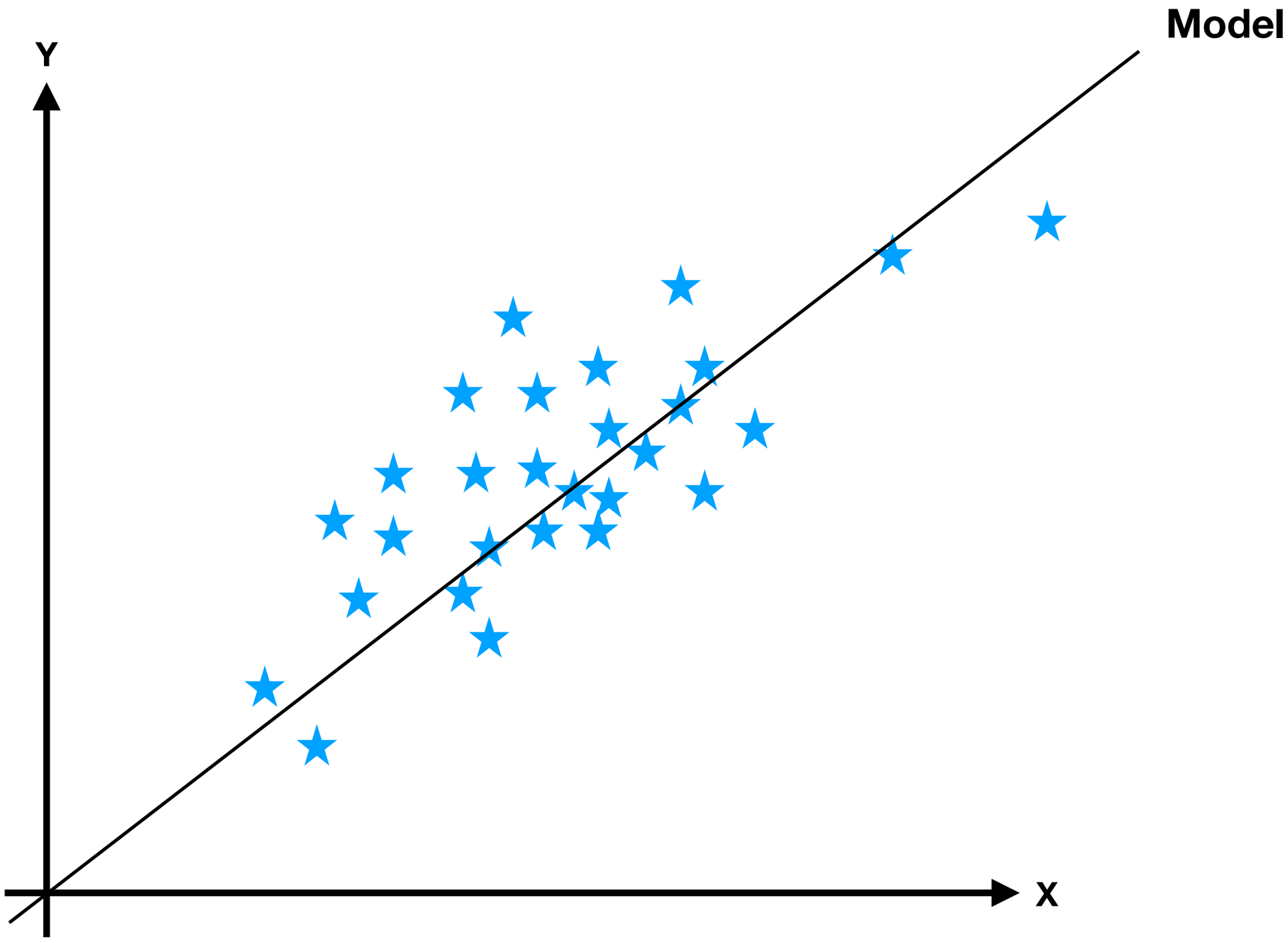
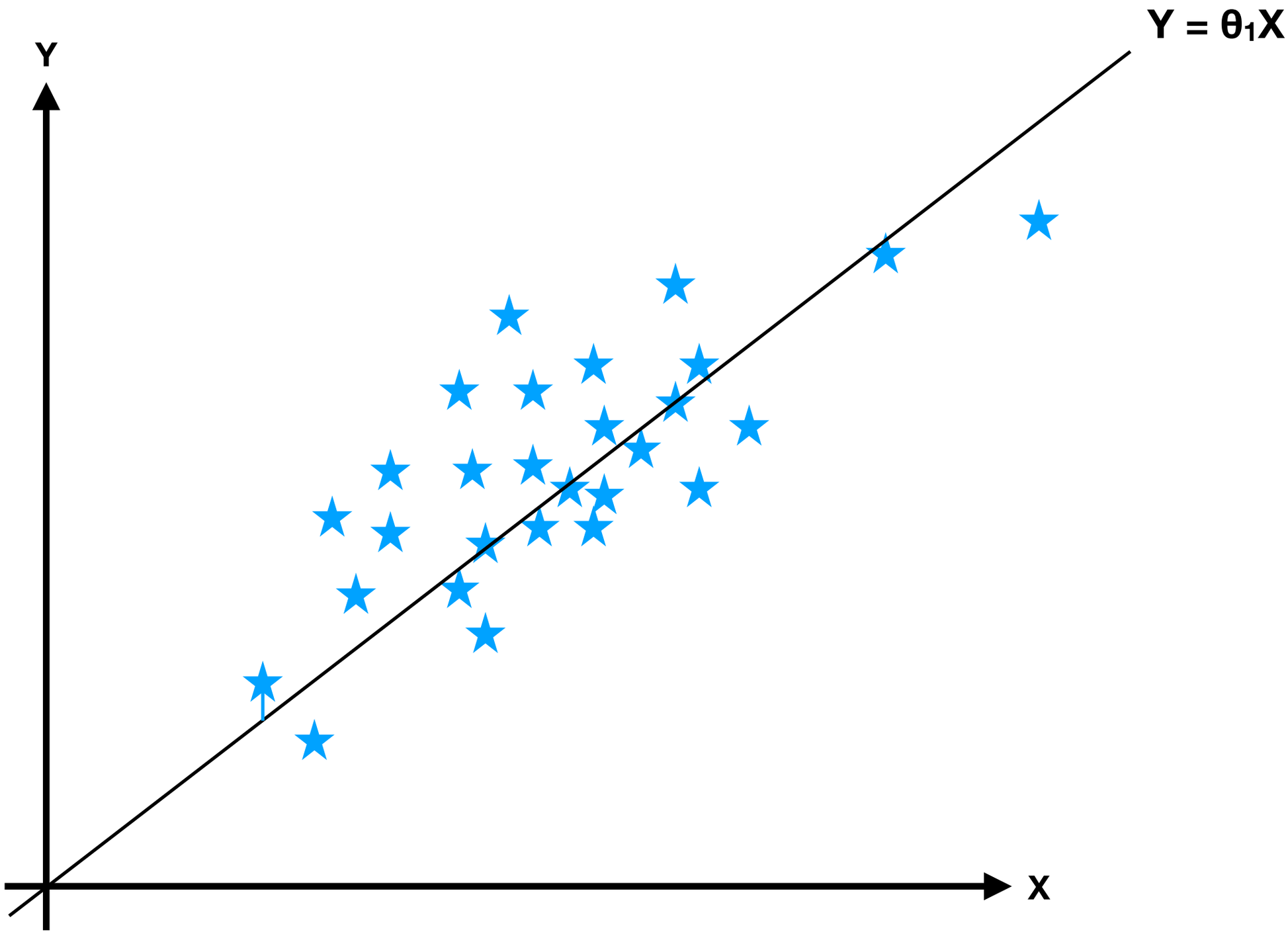
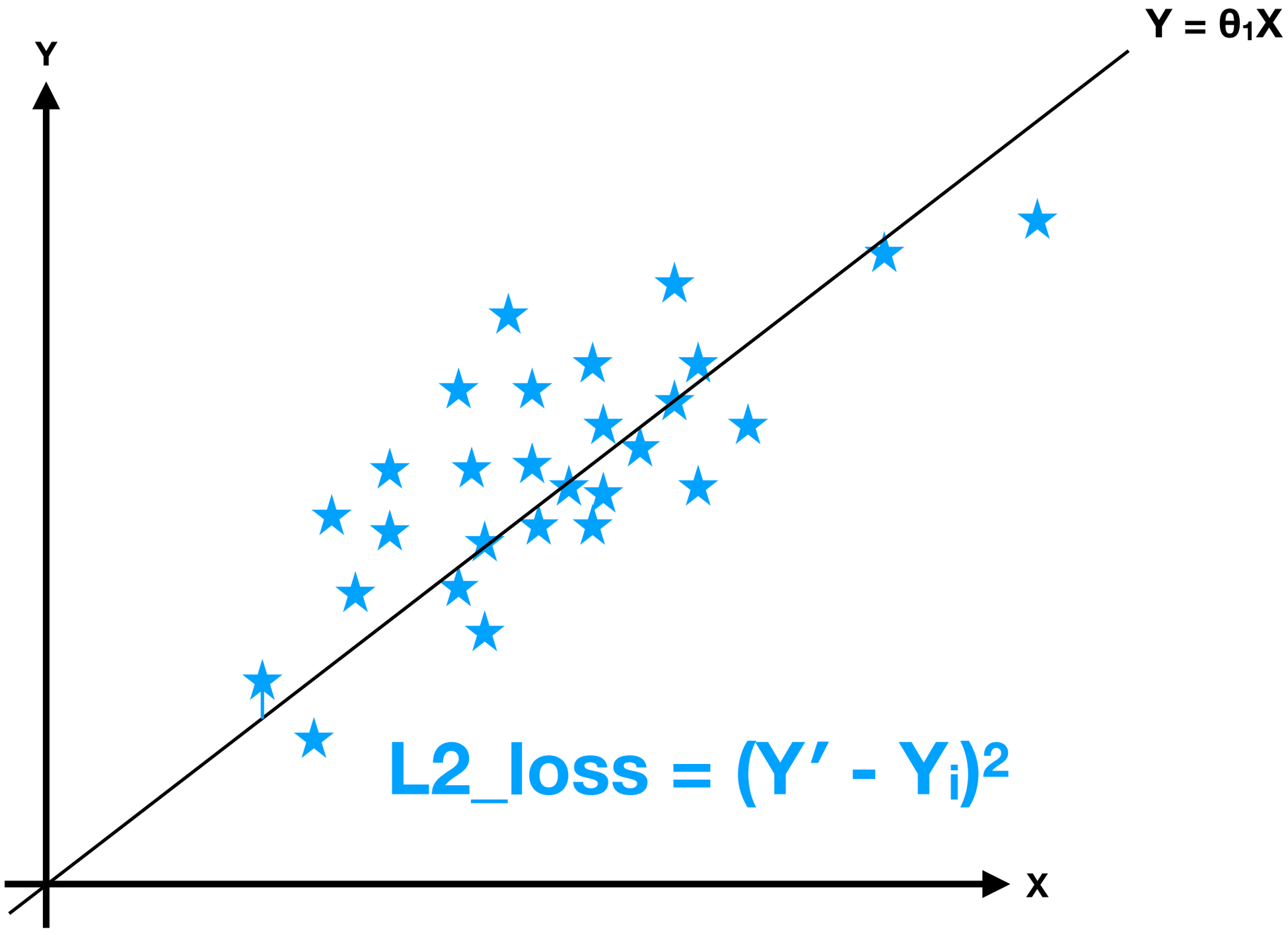
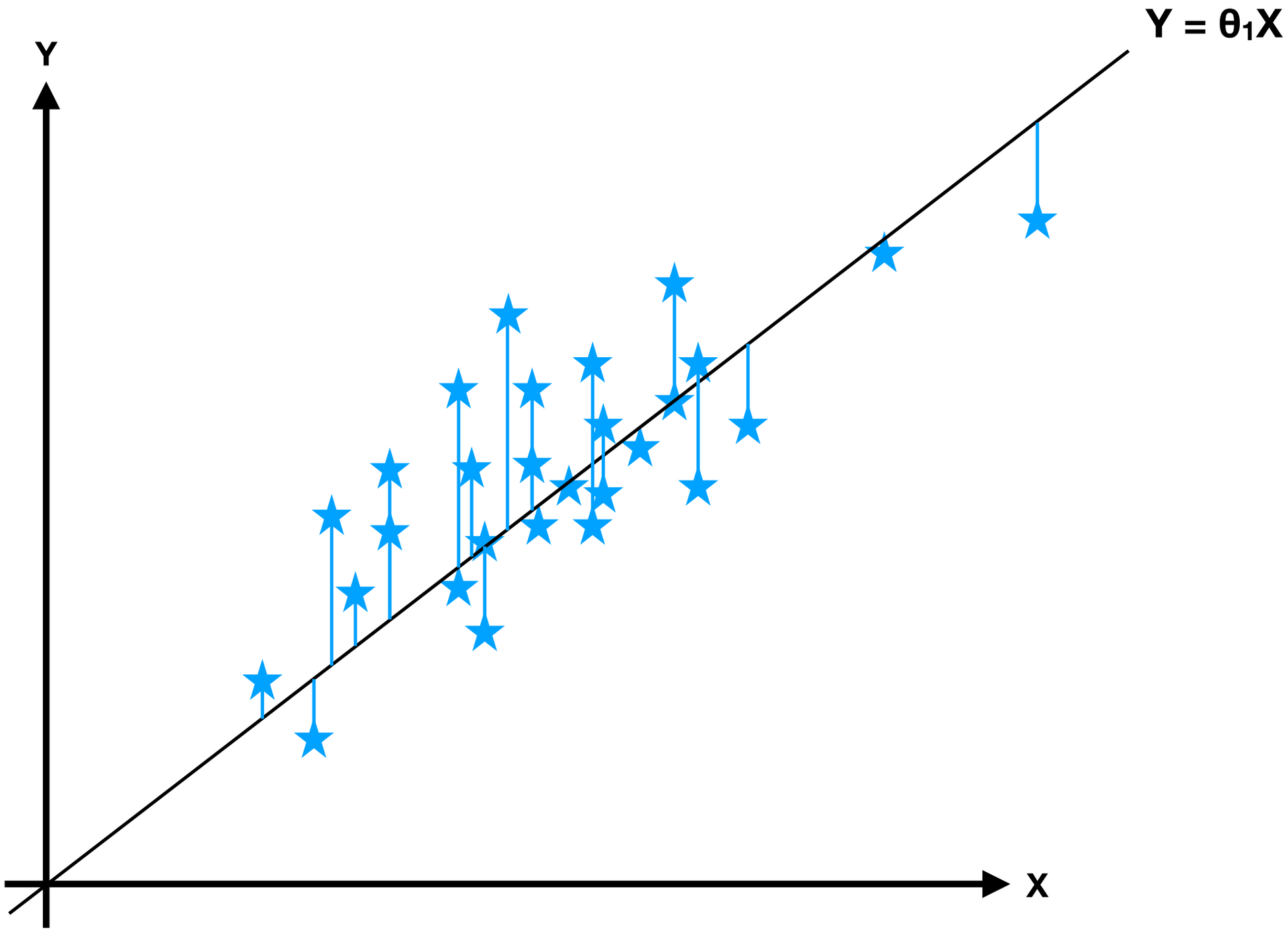
SC201

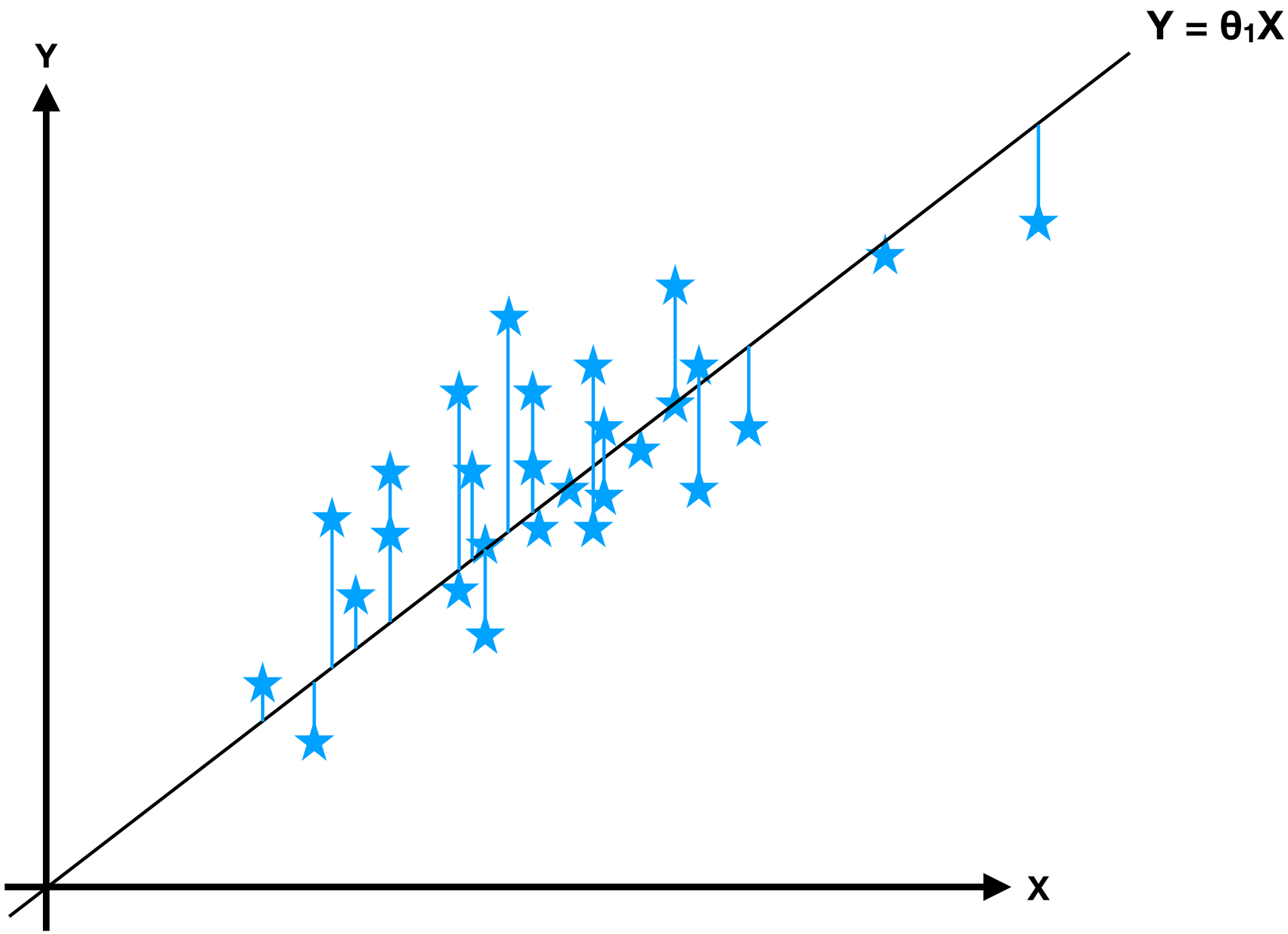
Lecture 2


Model
Y
X

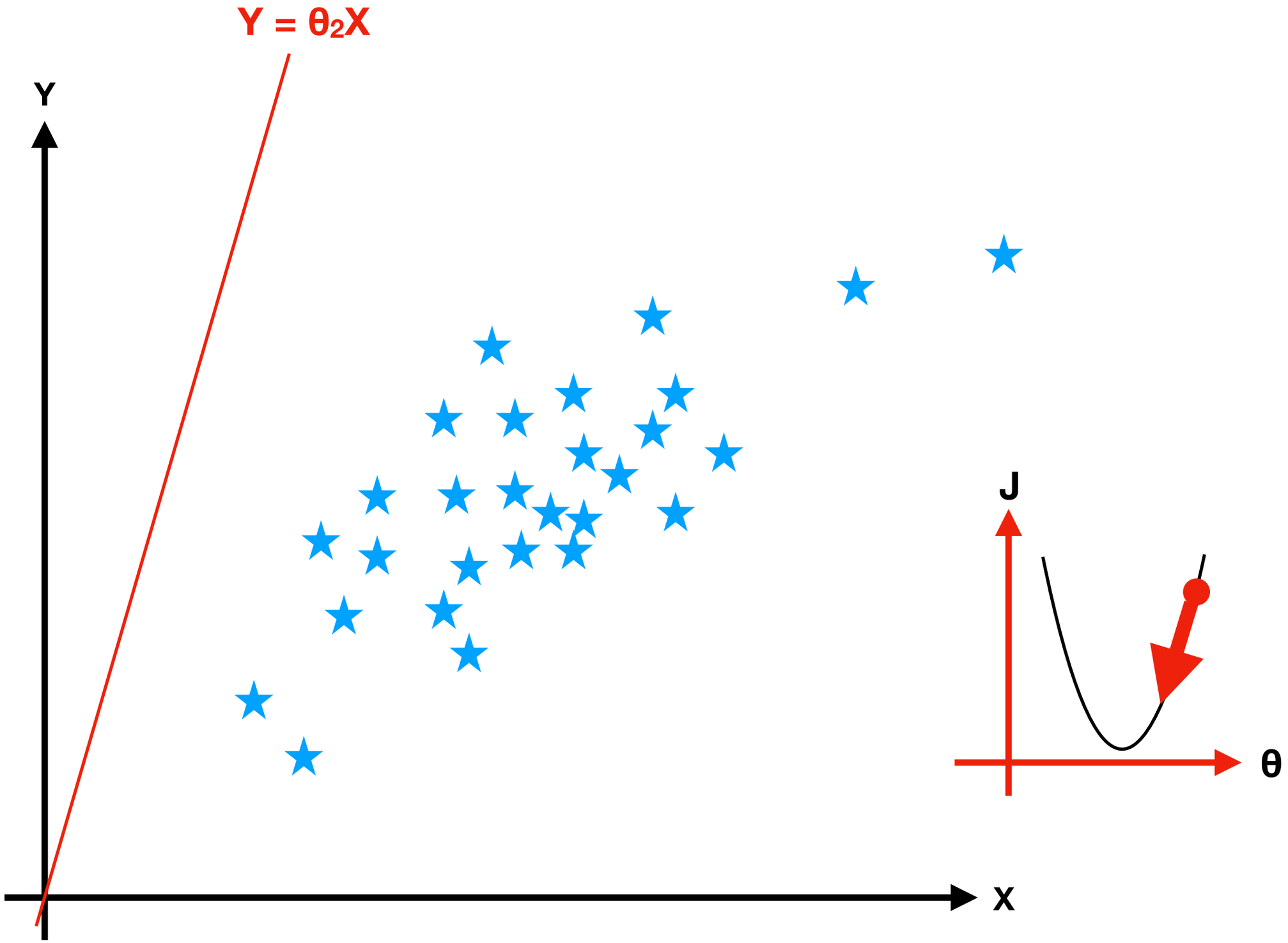

Y = θ1X
Y
X

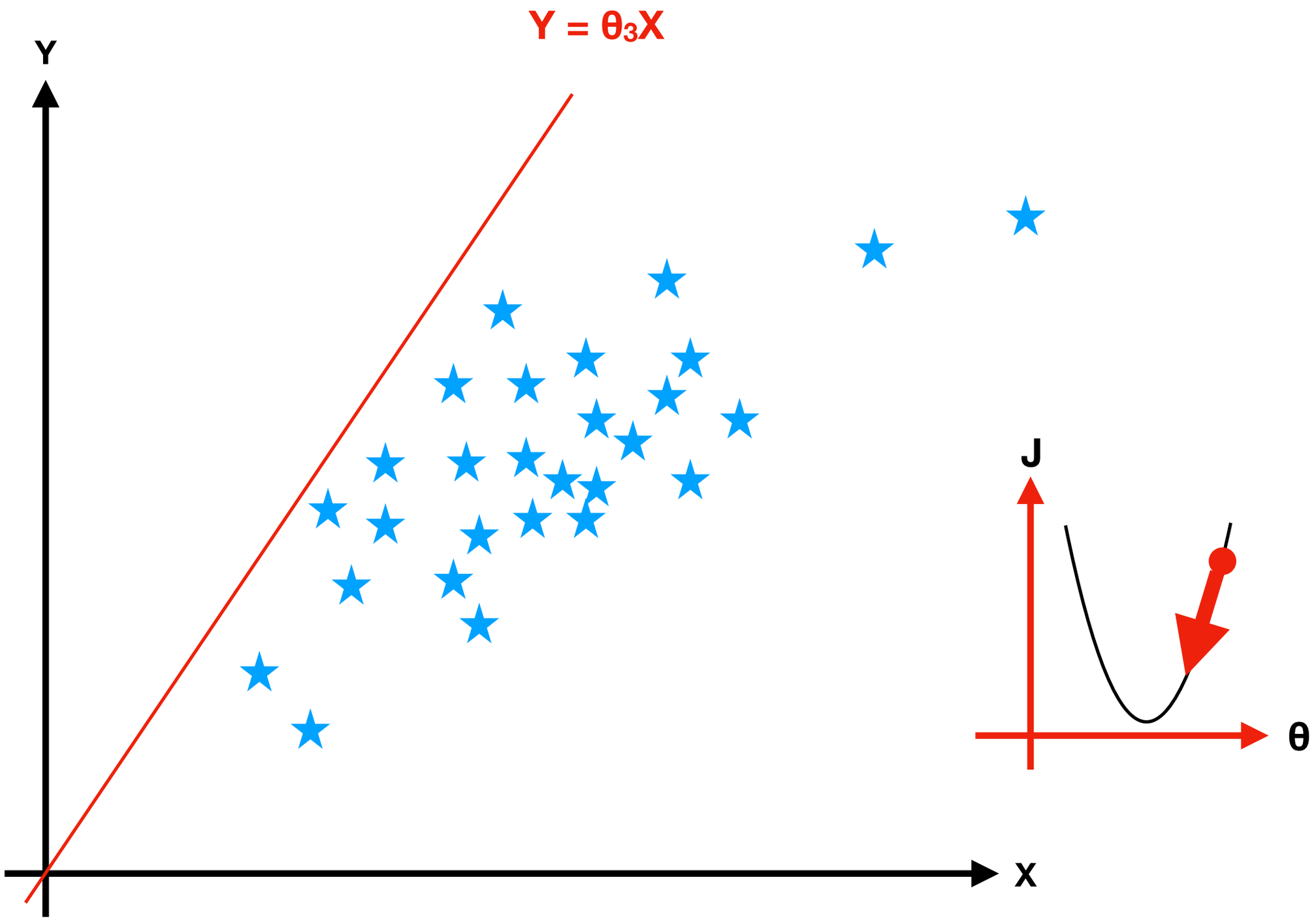

Y = θ1X
Y
x
L2_loss = (Y′ - Yi)2

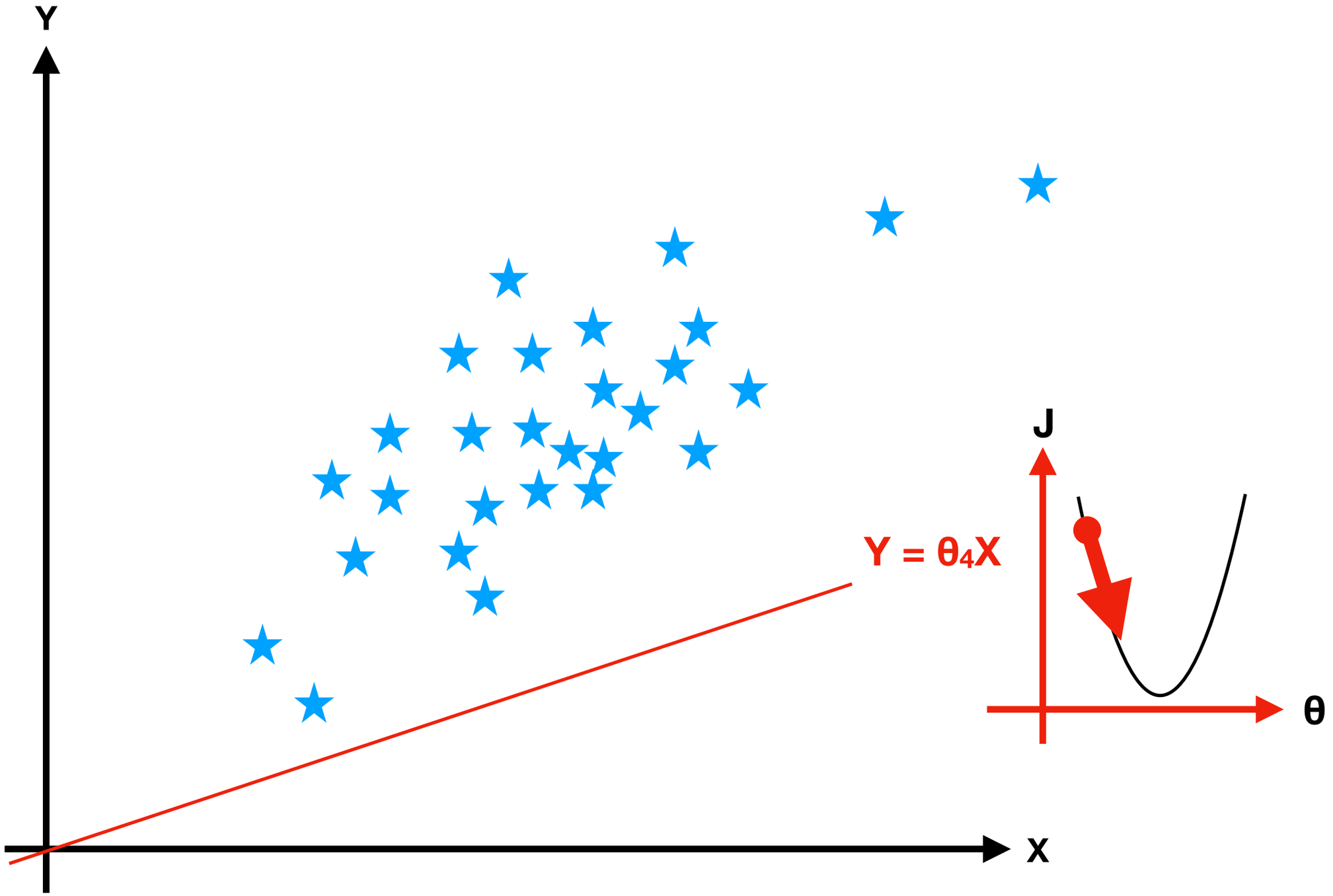

Y = θ1X
Y
X

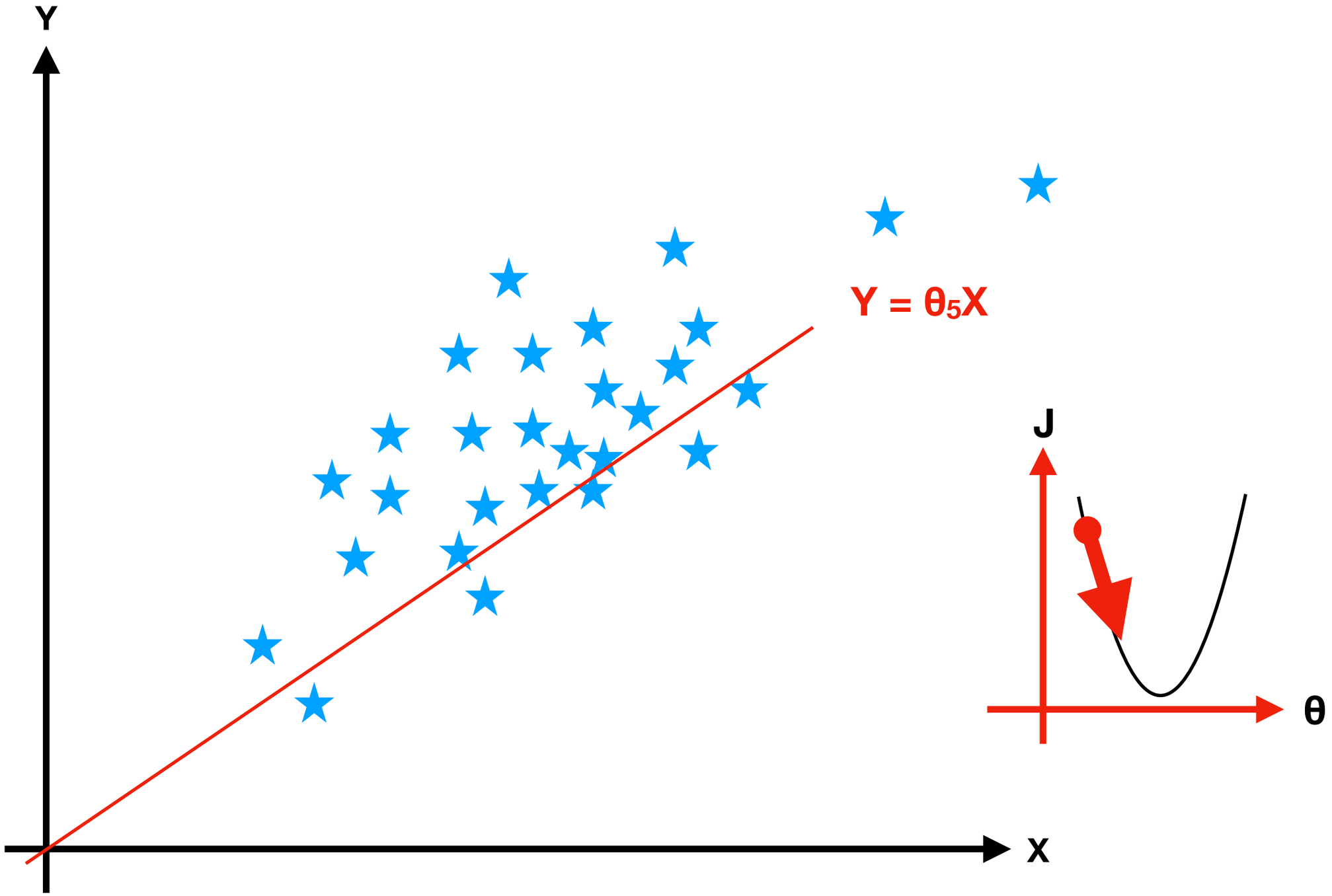


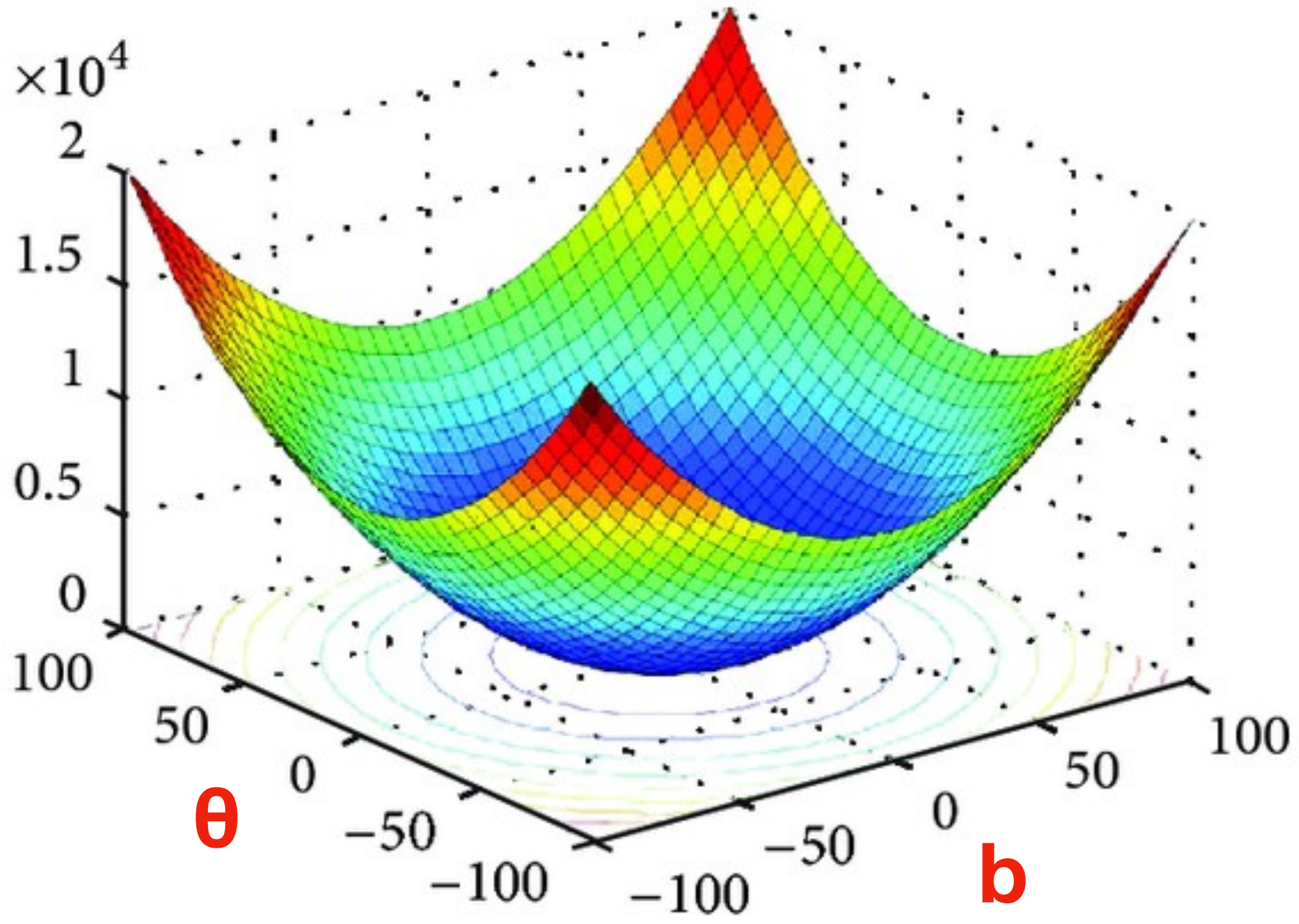
$$J = \Sigma (Y' - Y_i)^2 / 2m$$

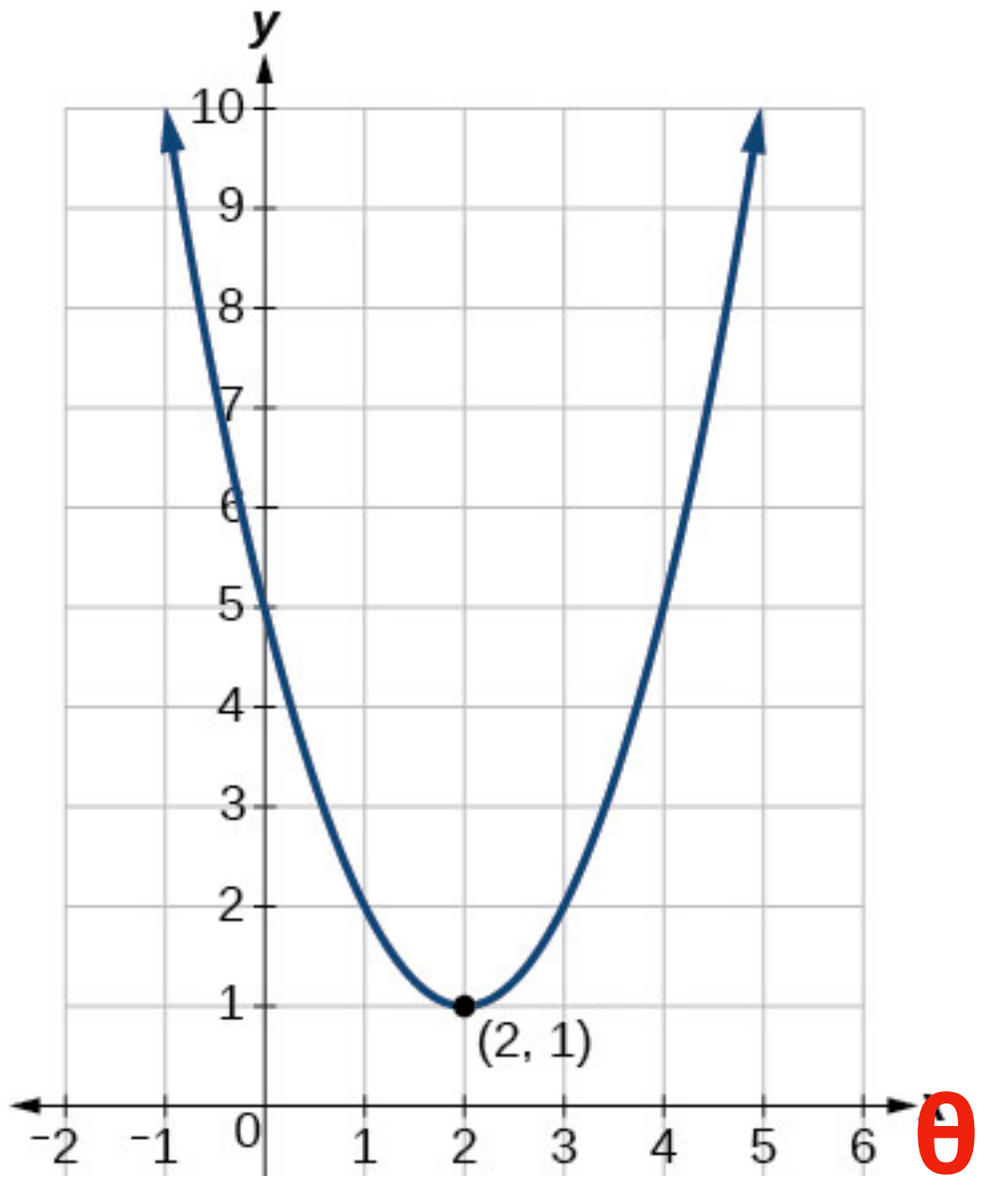

Y = θ2X
Y
X
J
θ

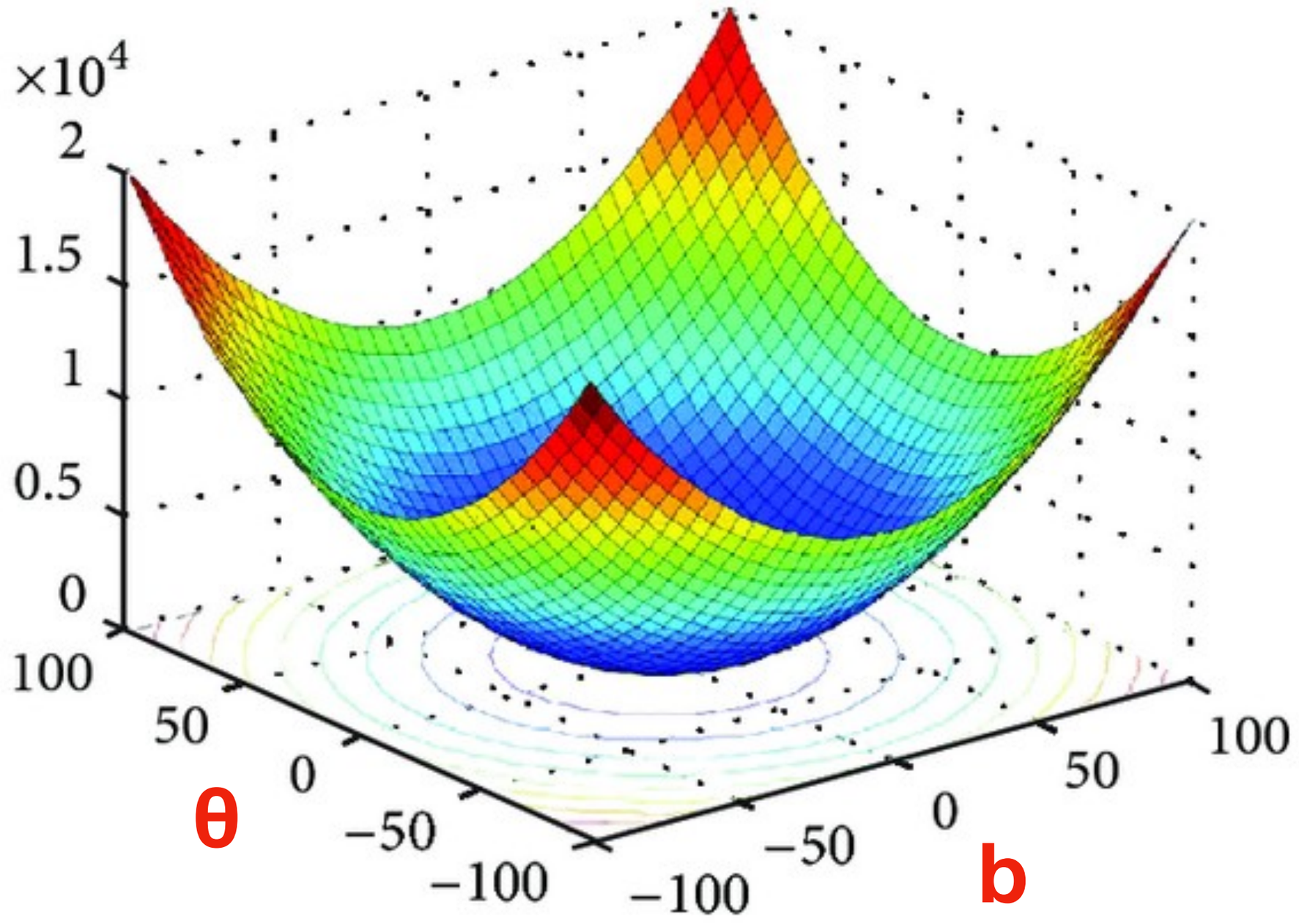

Y = θ3X
Y
X
J
θ

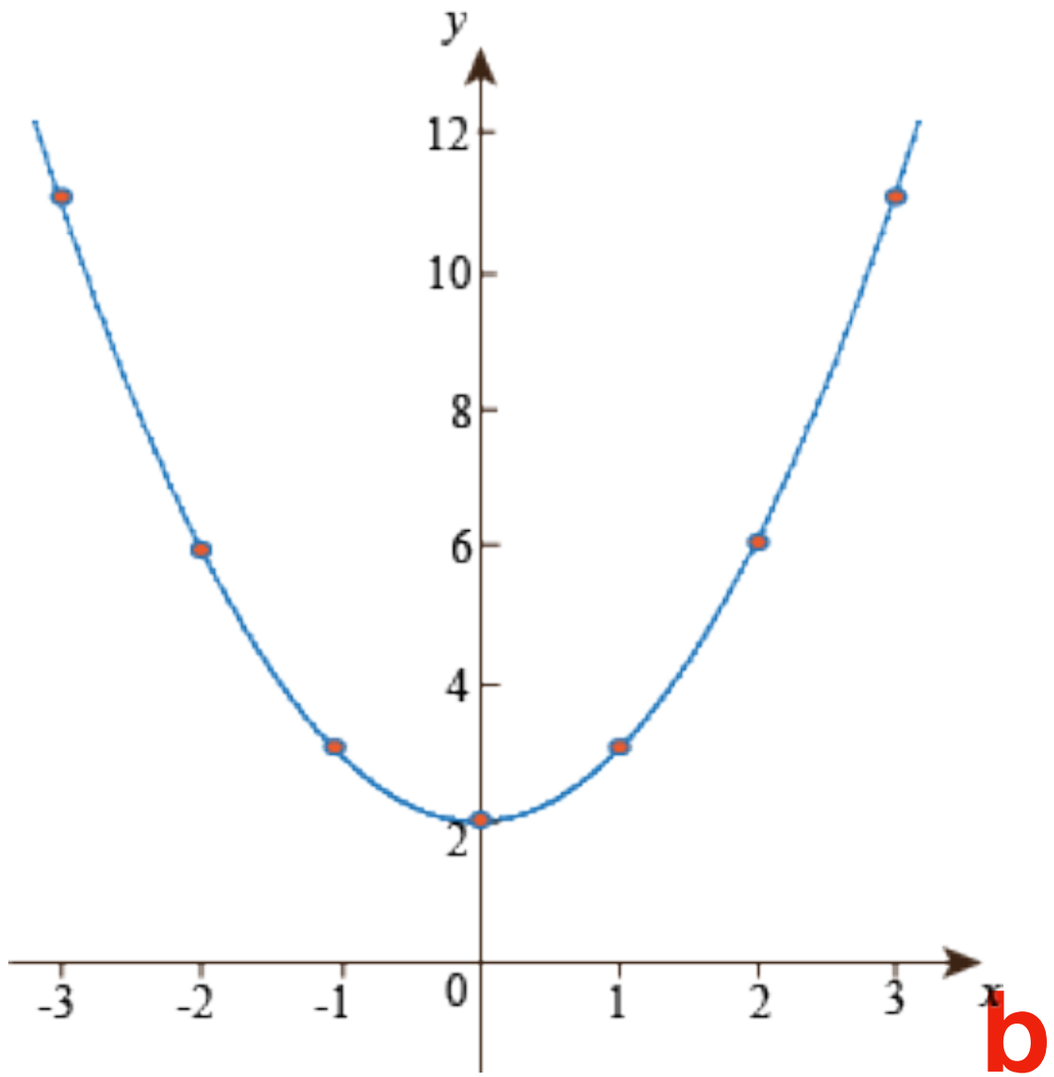

Y
x
J
θ
Y = θ4X


Y
Y = θ5X
J
θ
X


×10^4
2
1.5
1
0.5
0
100
50
0
−50
−100
θ
−100
−50
0
50
100
b

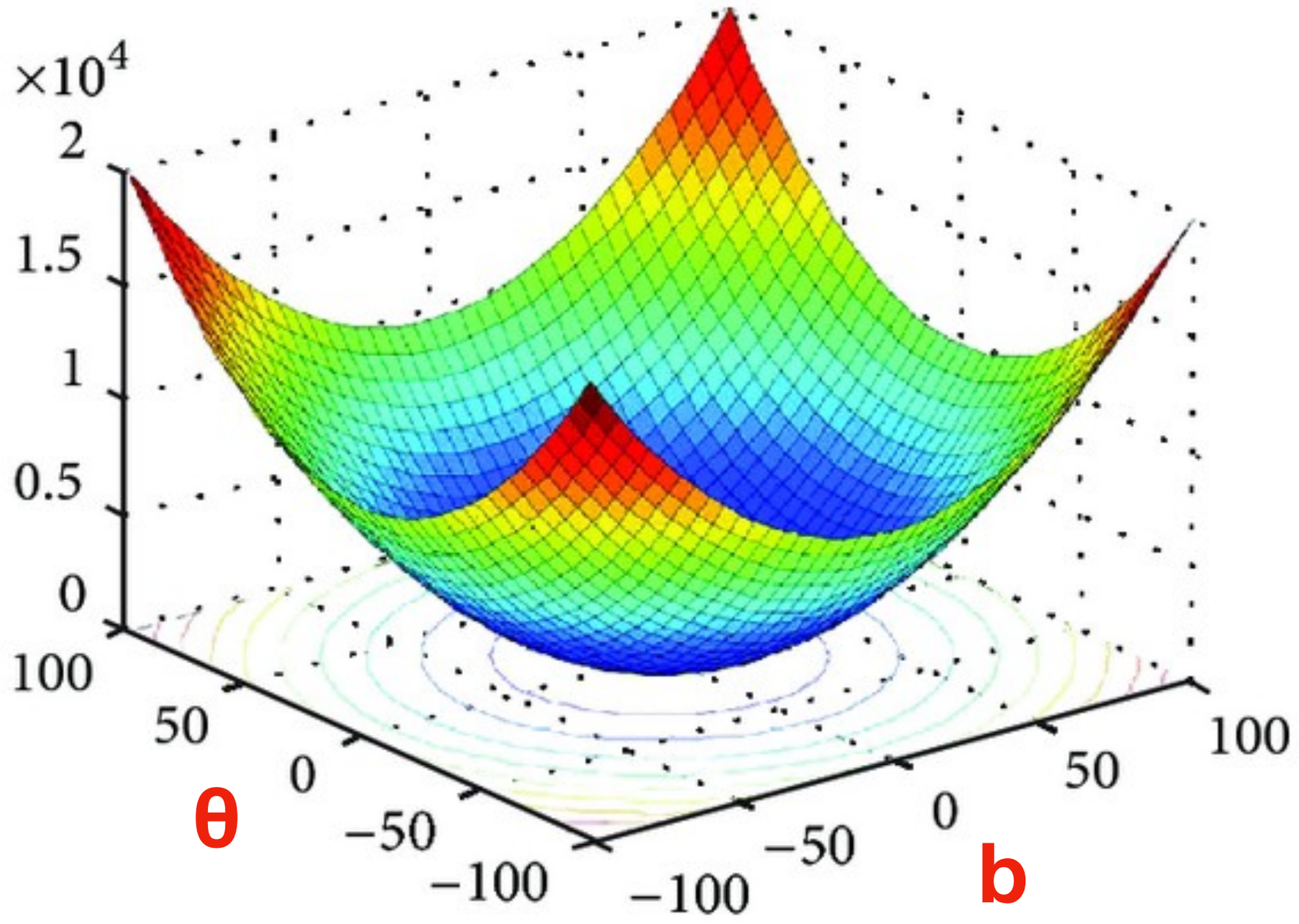

y
10
9
8
7
6
5
4
3
2
1
(2, 1)
−2
−1
0
1
2
3
4
5
6
θ

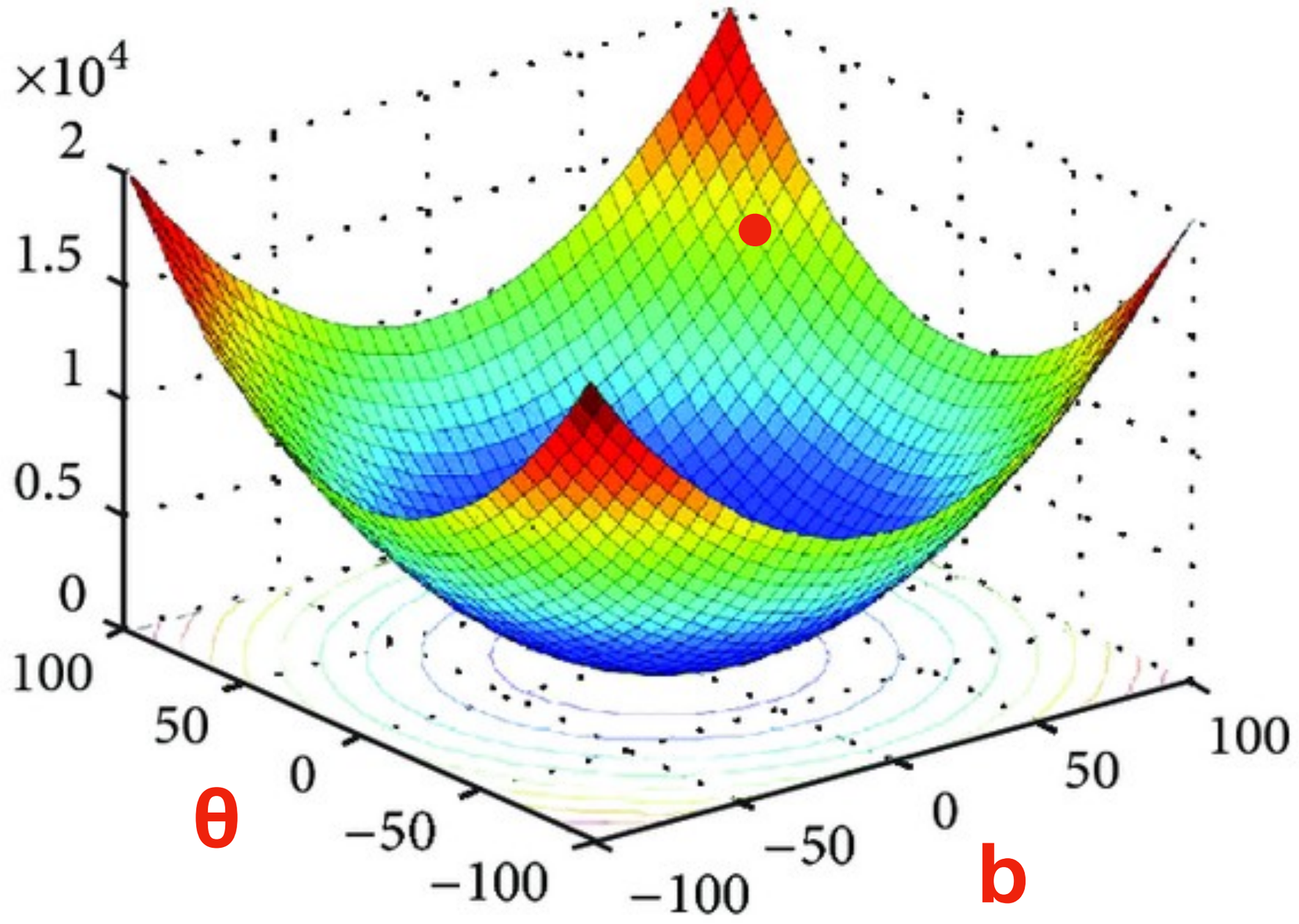

×10^4
2
1.5
1
0.5
0
100
50
0
−50
−100
θ
−100
−50
0
50
100
b



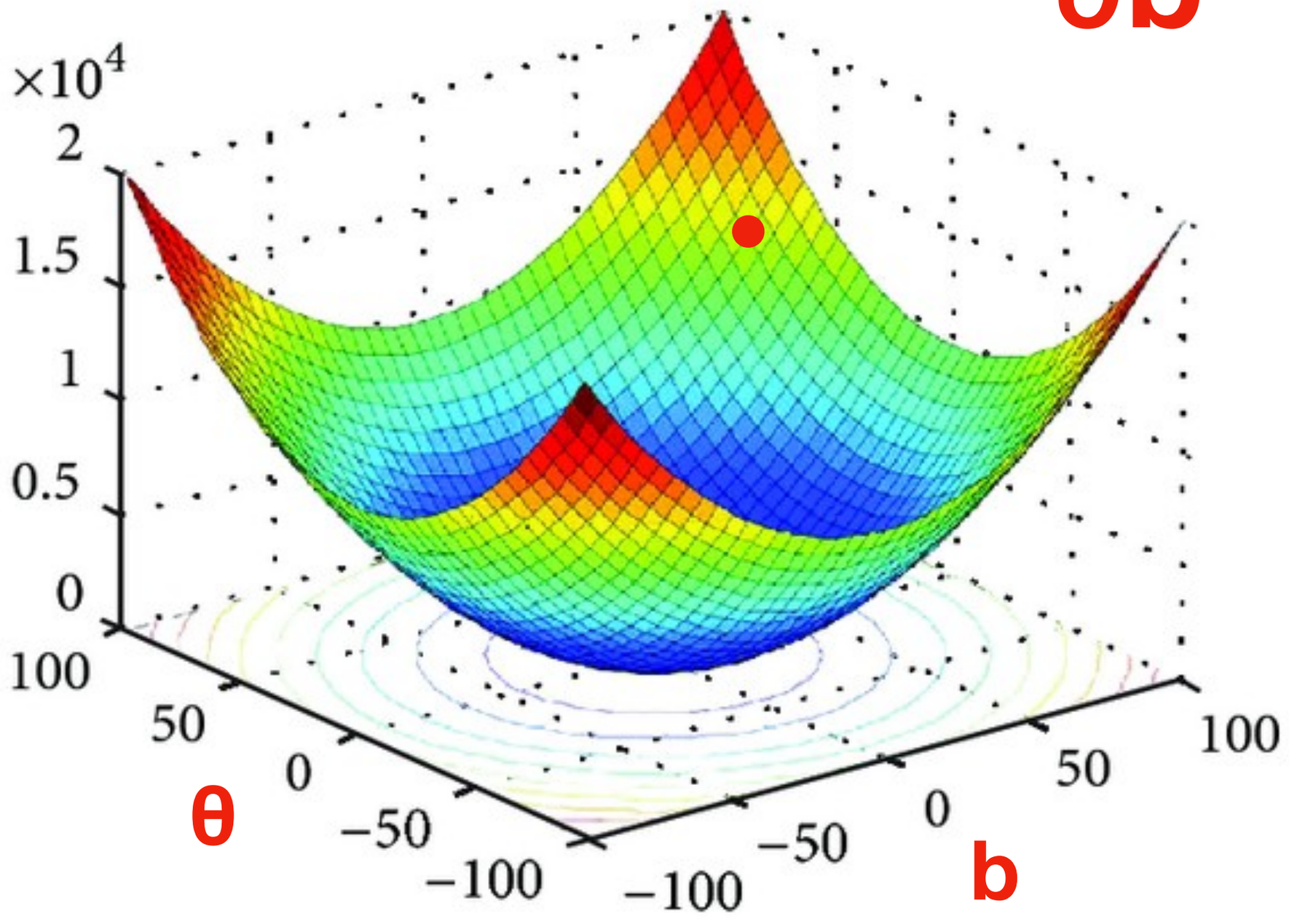
b

Update θ and b

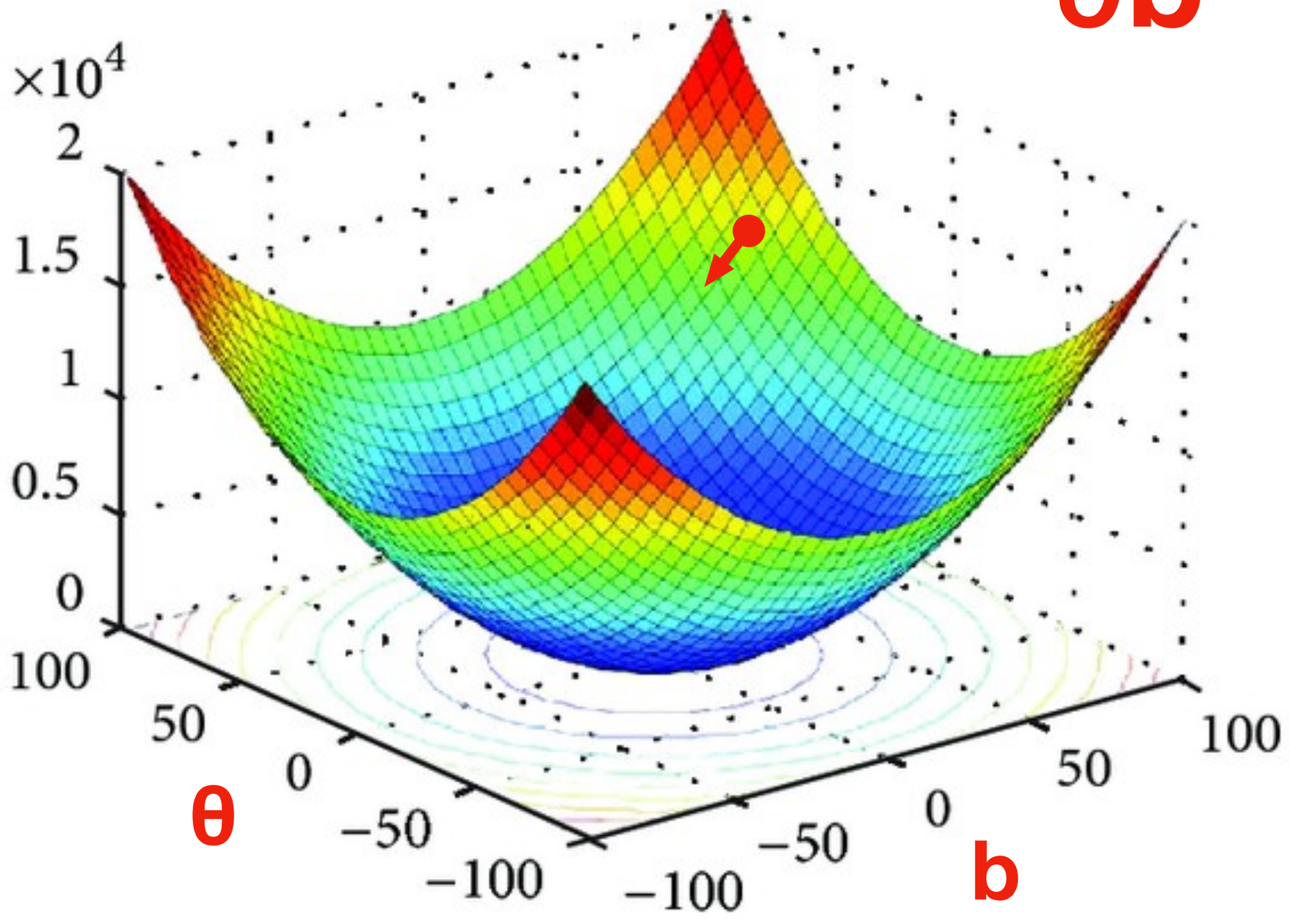

×10^4
2
1.5
1
0.5
0
100
50
0
−50
−100
θ
−100
−50
0
50
100
b


×10^4
2
1.5
1
0.5
0
100
50
0
−50
−100
θ
−100
−50
0
50
100
b

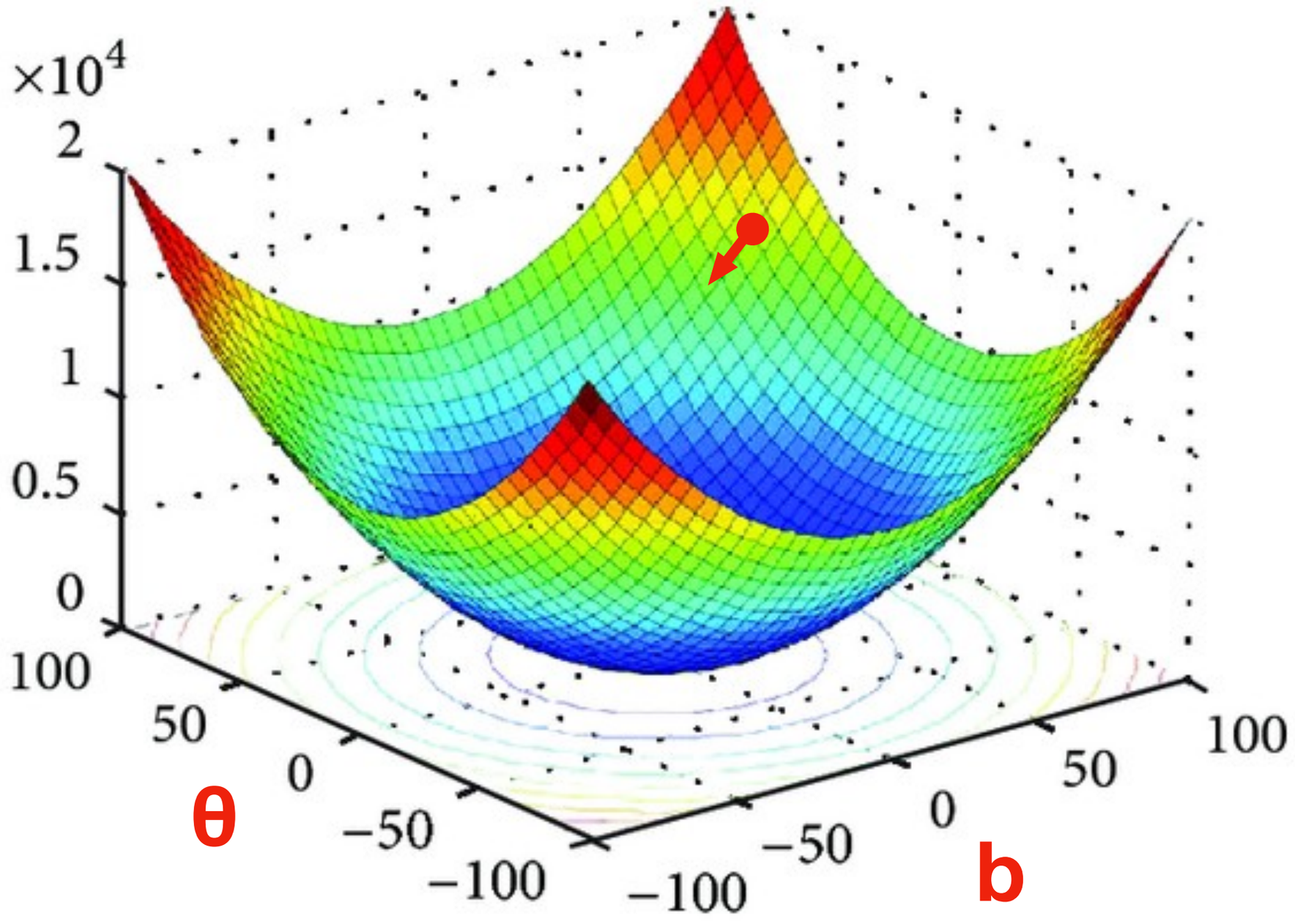
$$\frac{\partial J}{\partial b} > 0$$



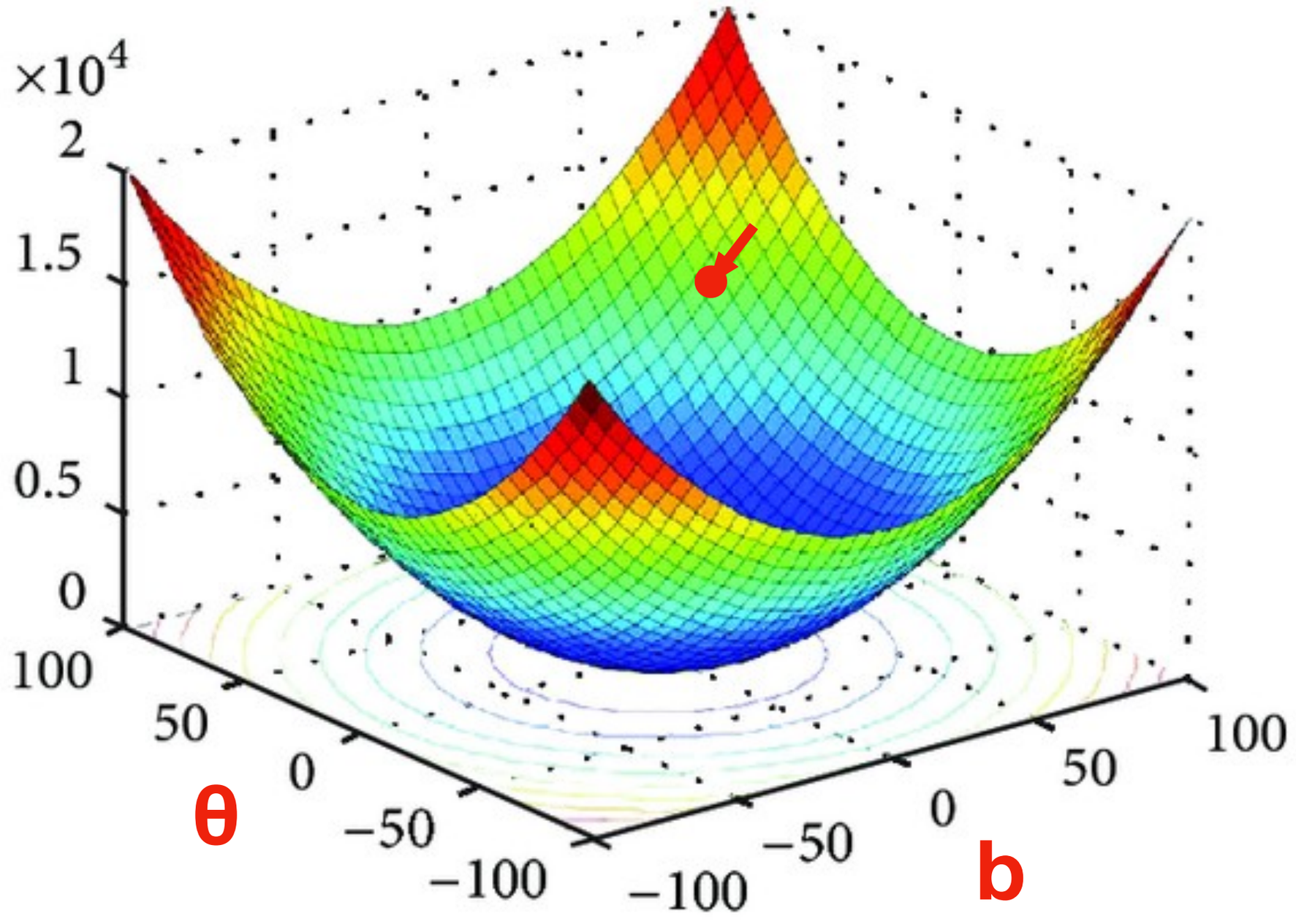
$$\frac{\partial J}{\partial b} > 0$$



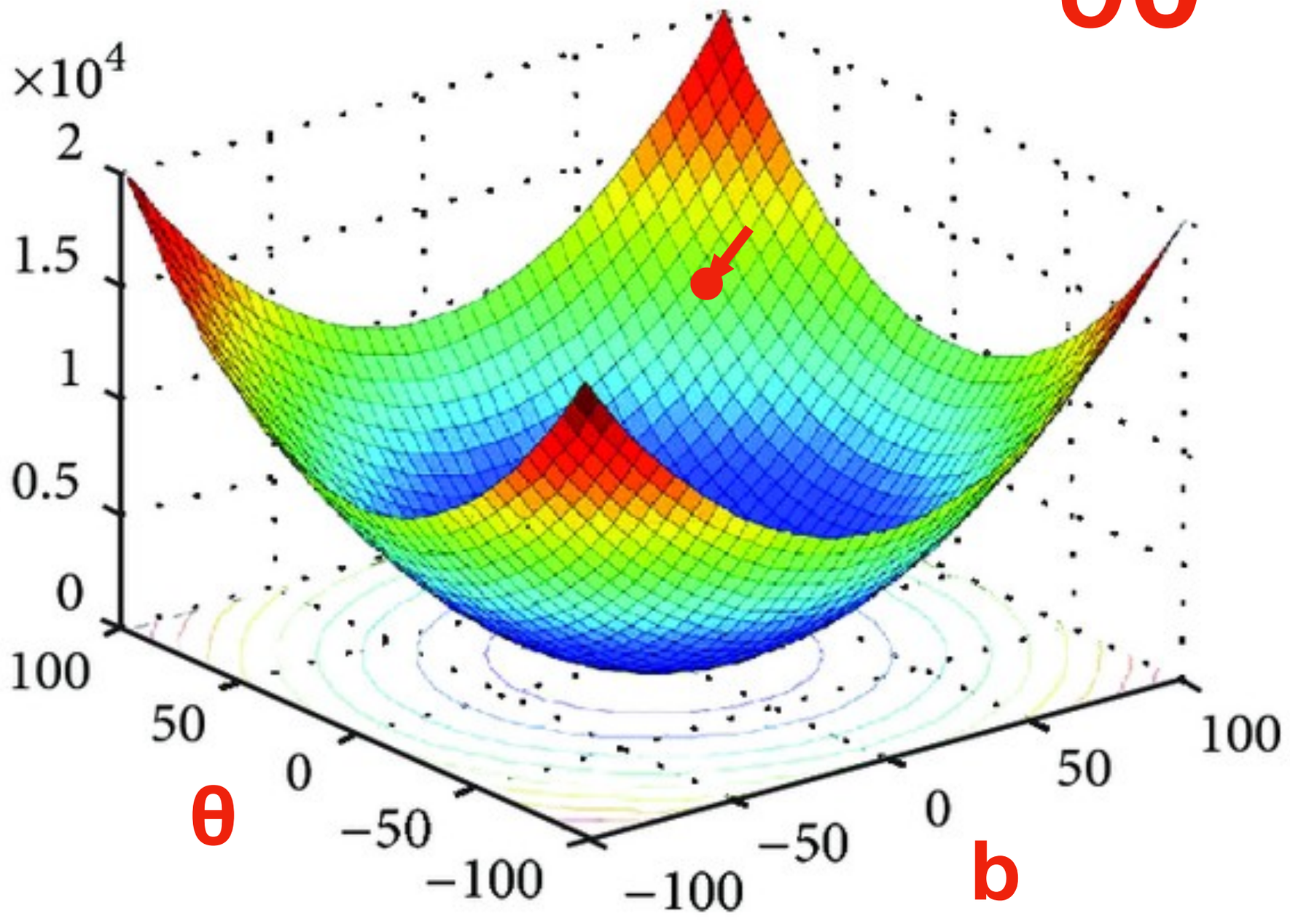
$$b = b - \alpha \frac{\partial J}{\partial b}$$



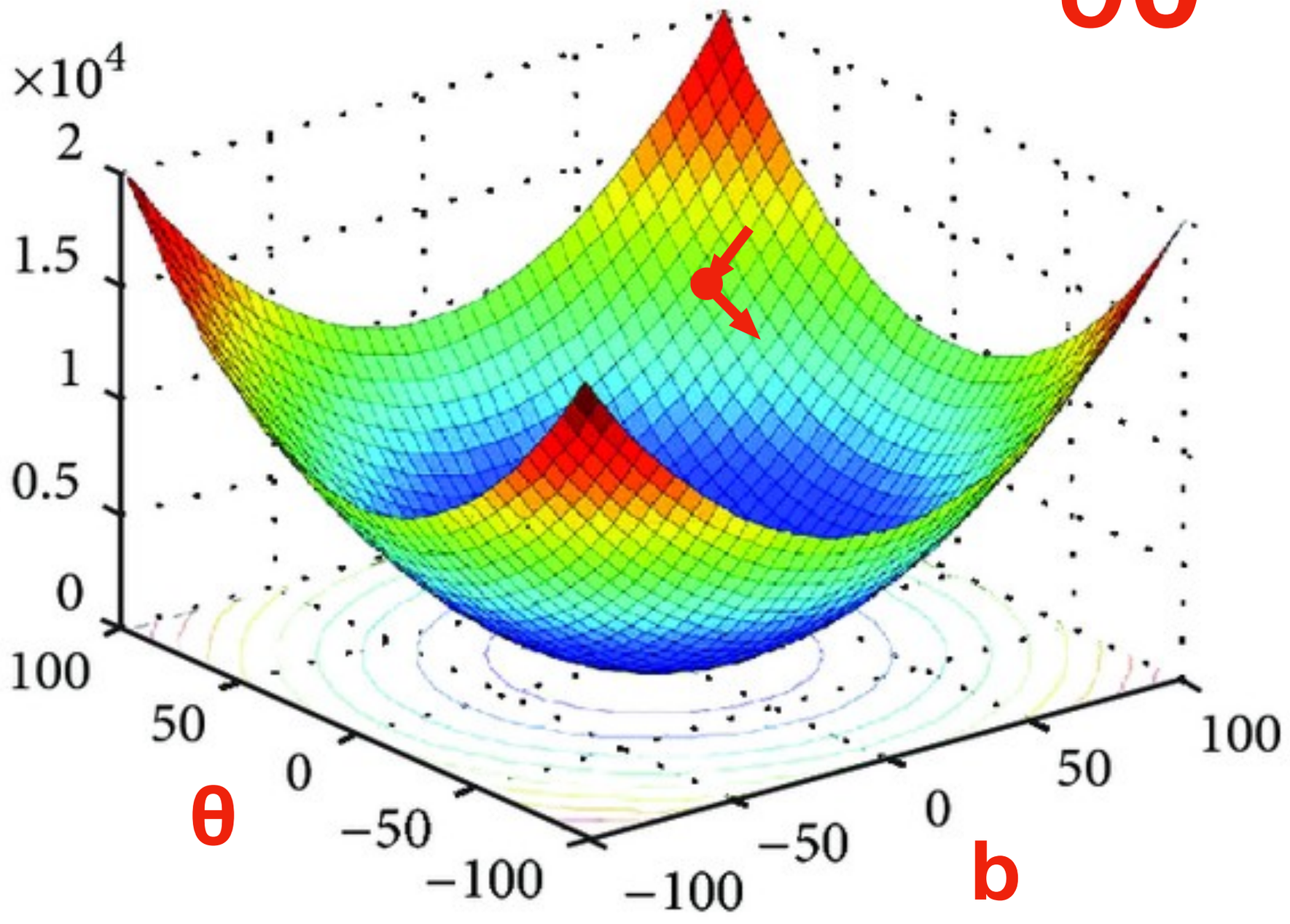
$$b = b - \alpha \frac{\partial J}{\partial b}$$



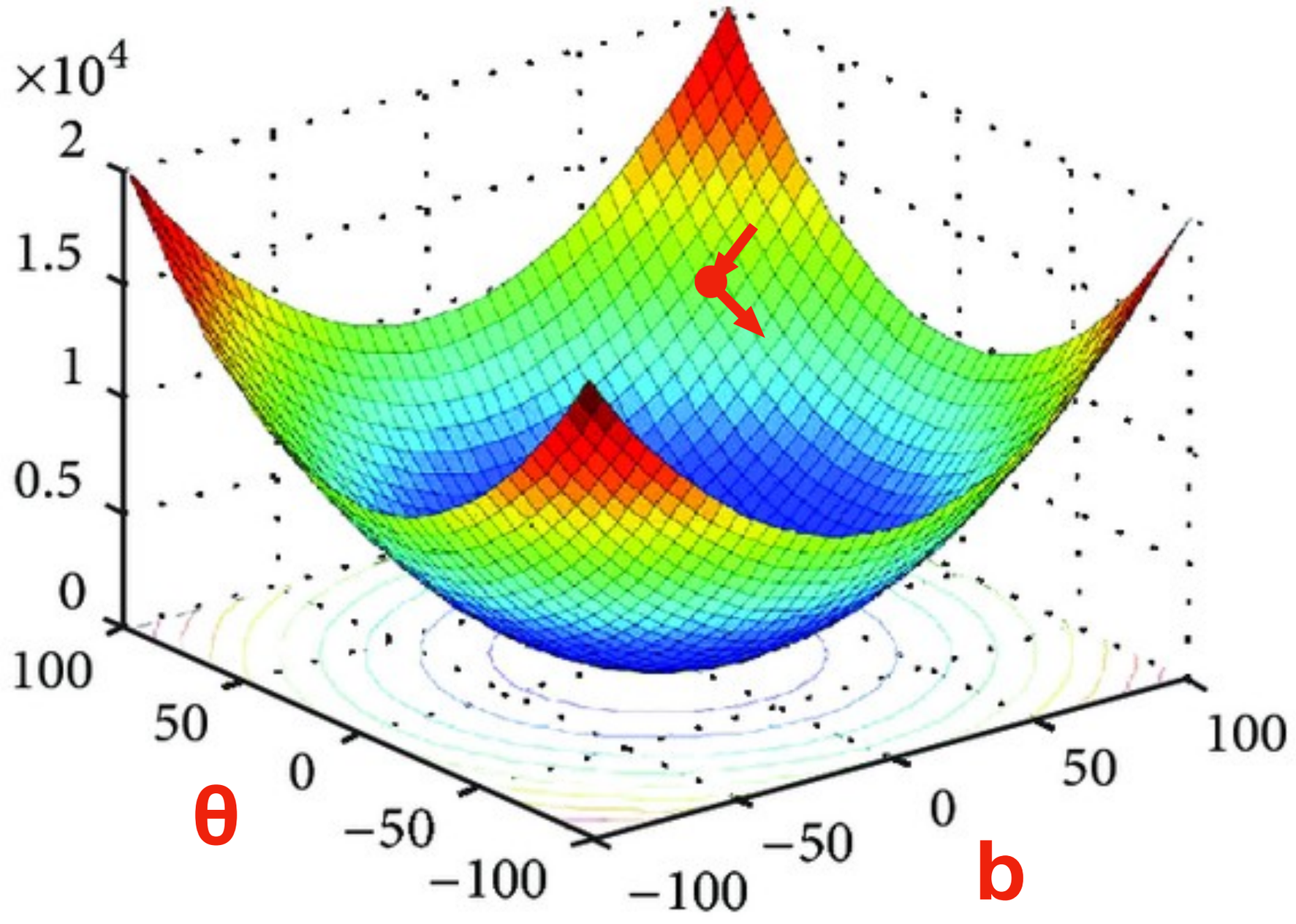
$$\frac{\partial J}{\partial \theta} < 0$$



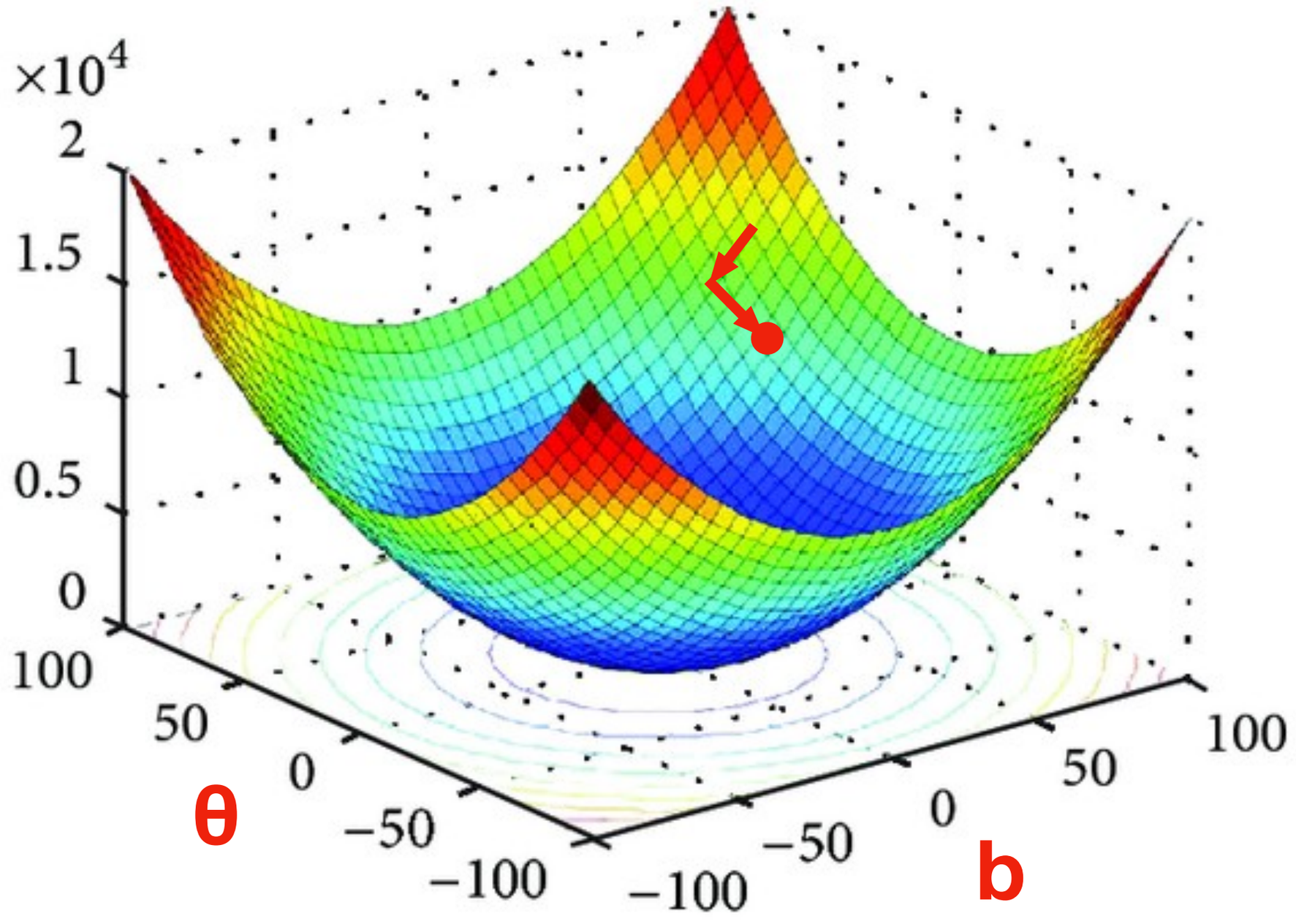
$$\frac{\partial J}{\partial \theta} < 0$$

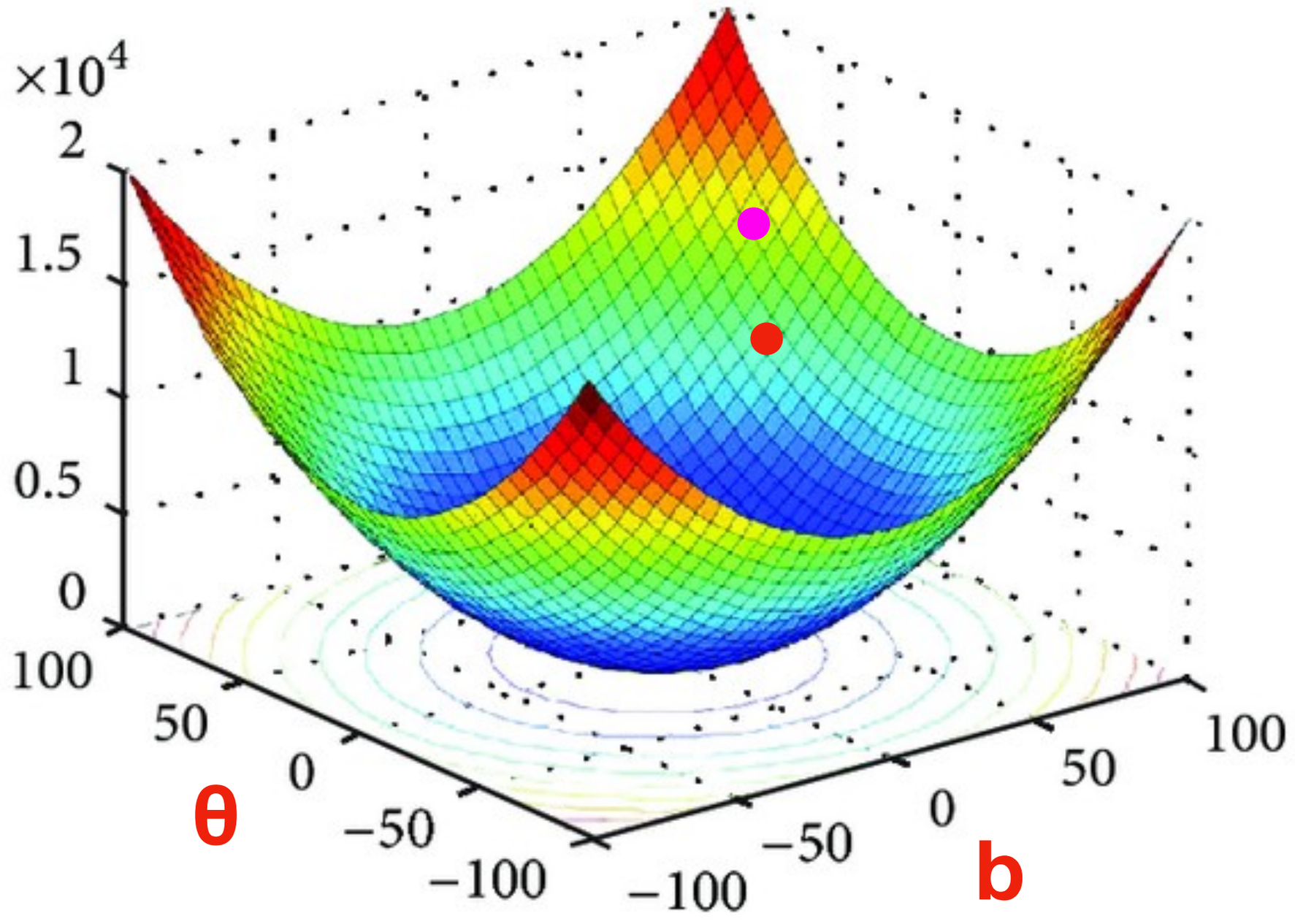


$$\theta = \theta - \alpha \frac{\partial J}{\partial \theta}$$



$$\theta=\theta-\alpha\frac{\partial J}{\partial \theta}$$




×10^4
2
1.5
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0.5
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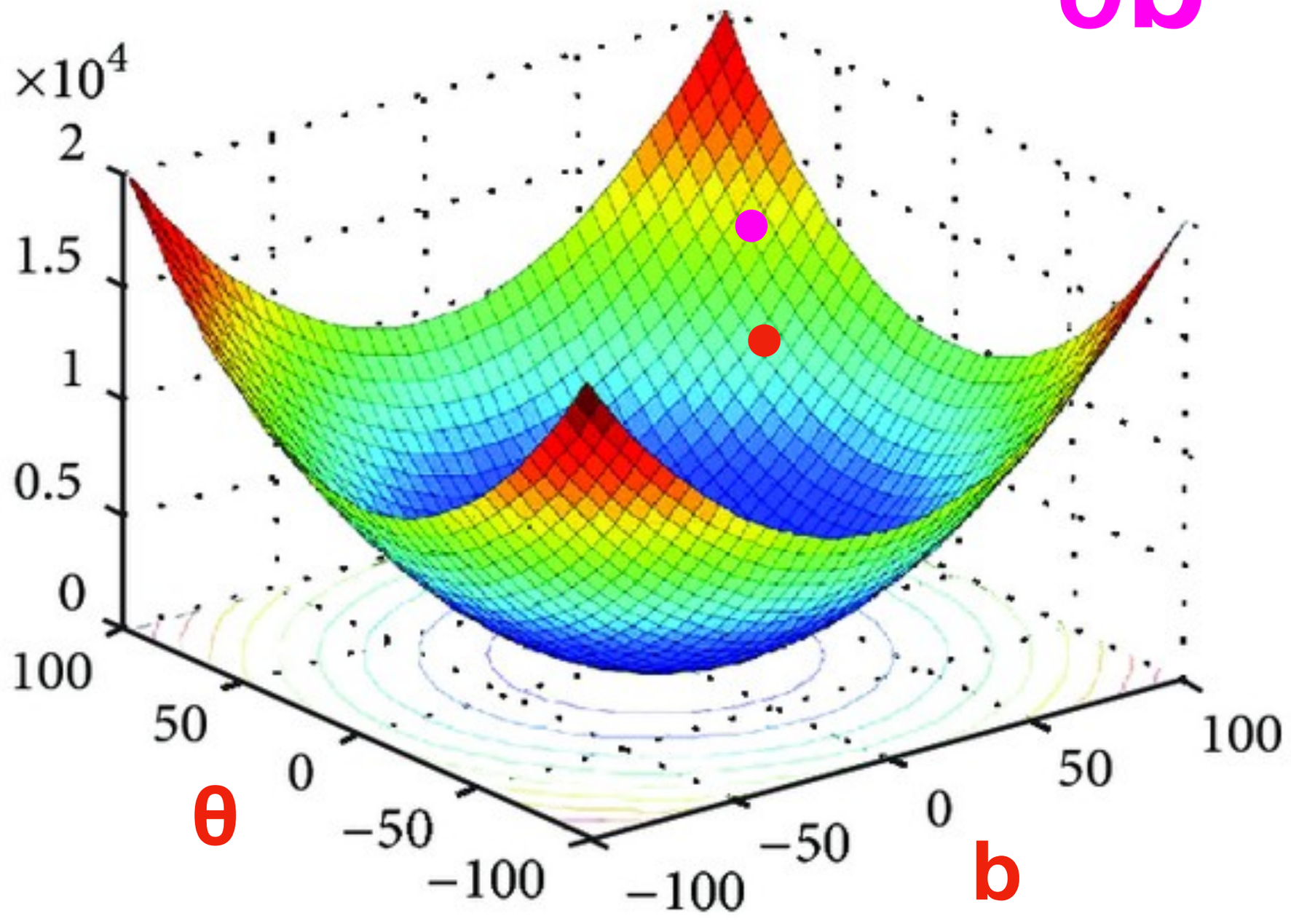
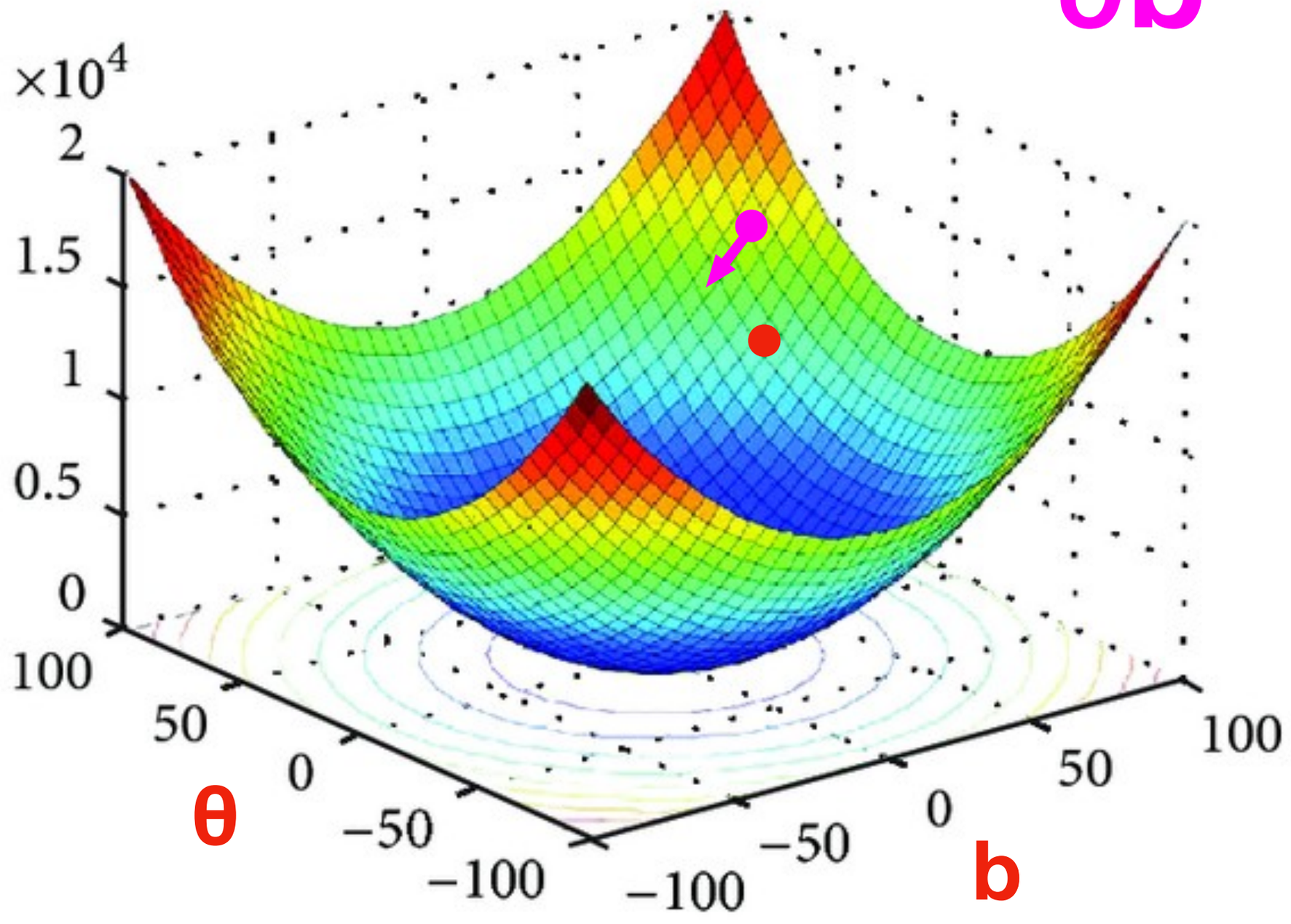
−50
−100
θ
−100
−50
0
50
100
b

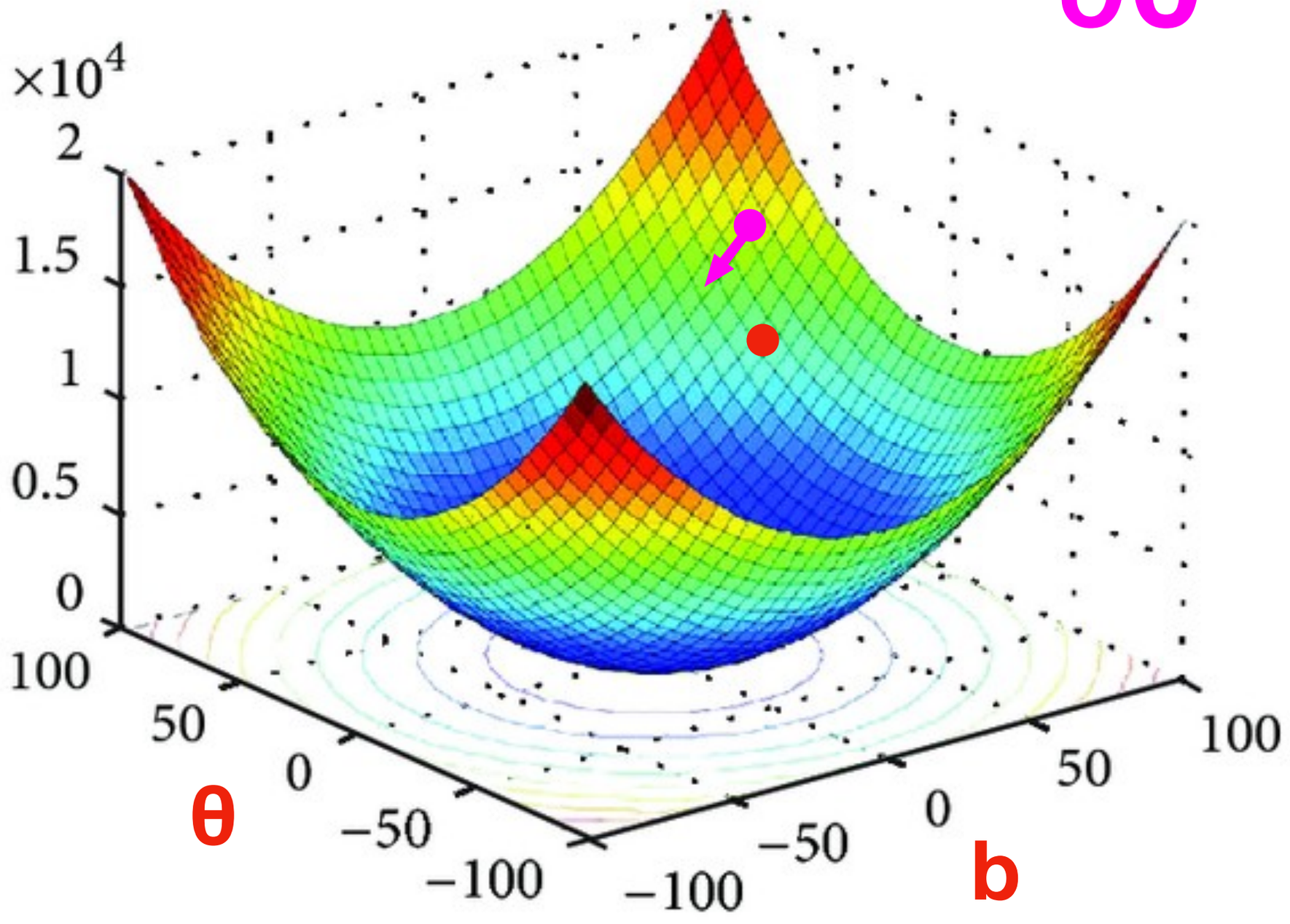
$$\frac{\partial J}{\partial b} > 0$$



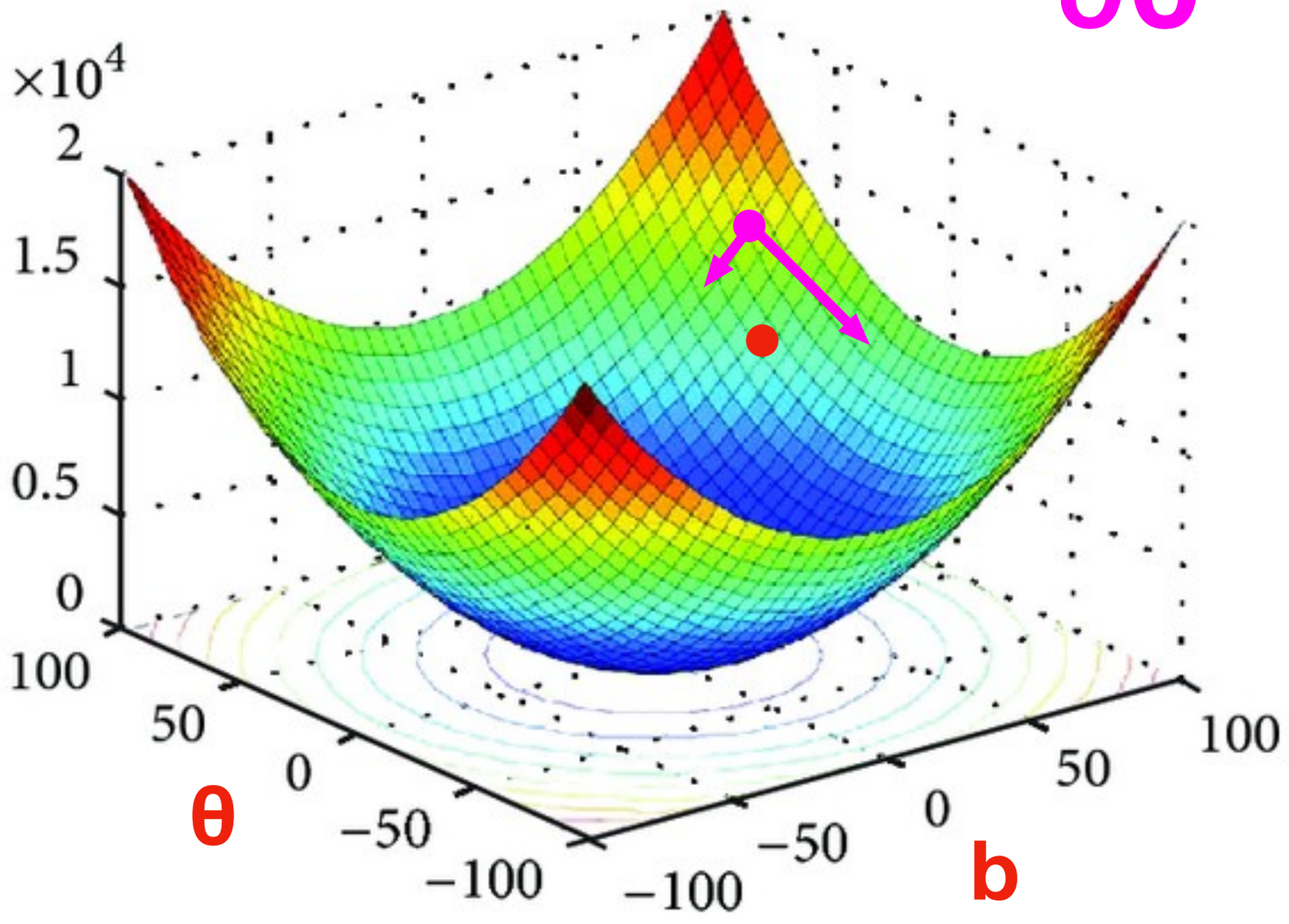
$$\frac{\partial J}{\partial b} > 0$$



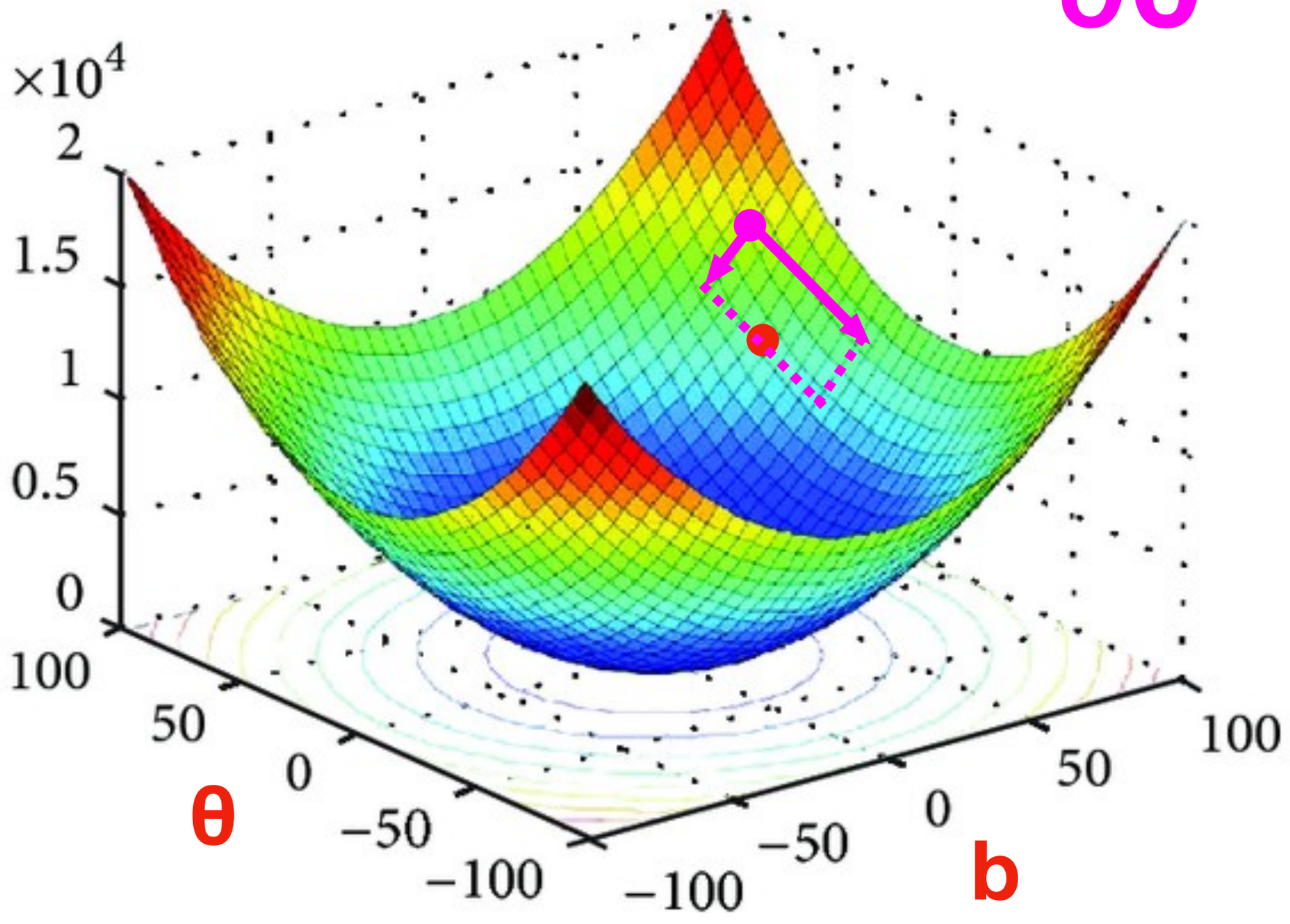
$$\frac{\partial J}{\partial \theta} < 0$$



$$\frac{\partial J}{\partial \theta} < 0$$

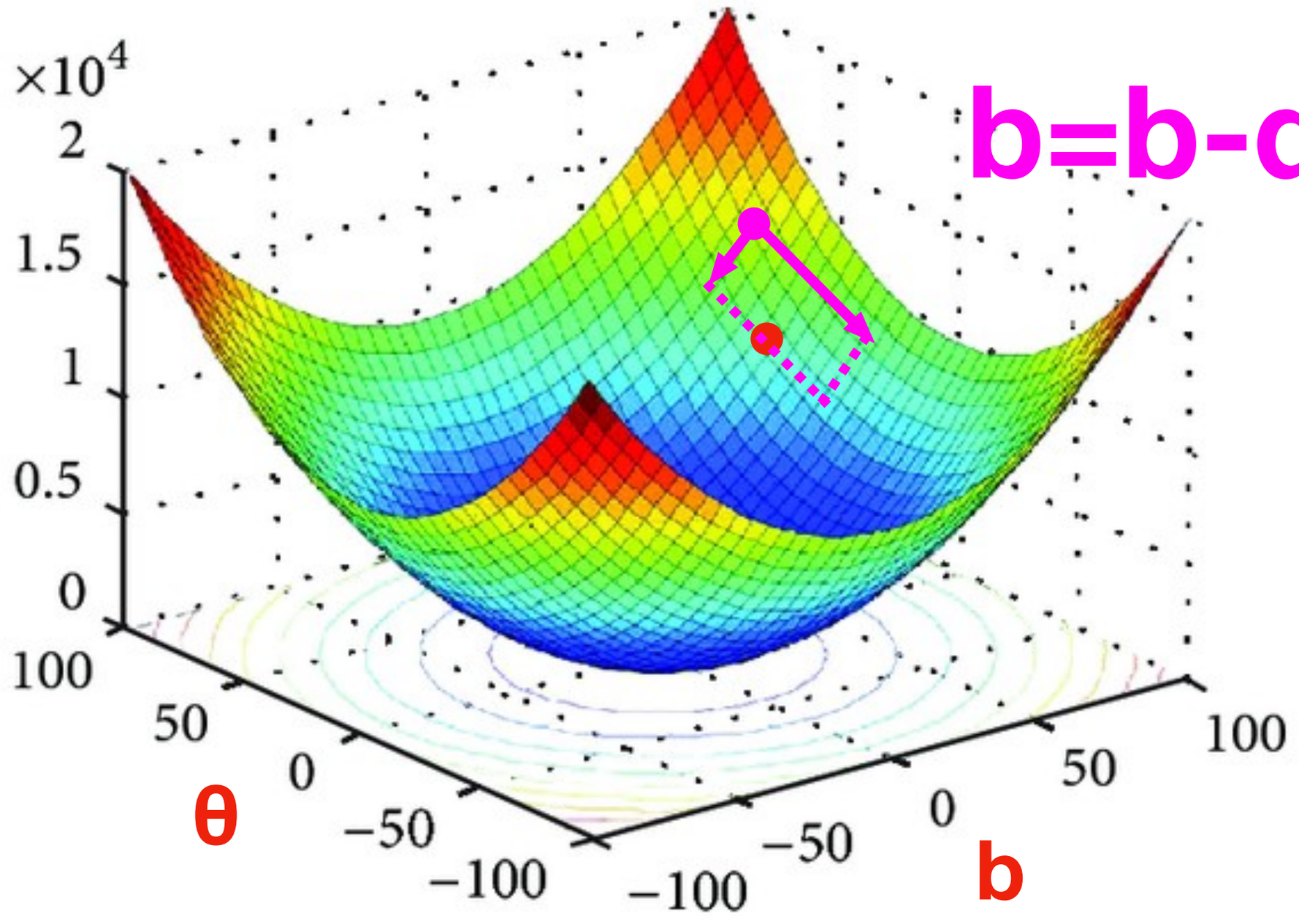


$$\frac{\partial J}{\partial \theta} < 0$$



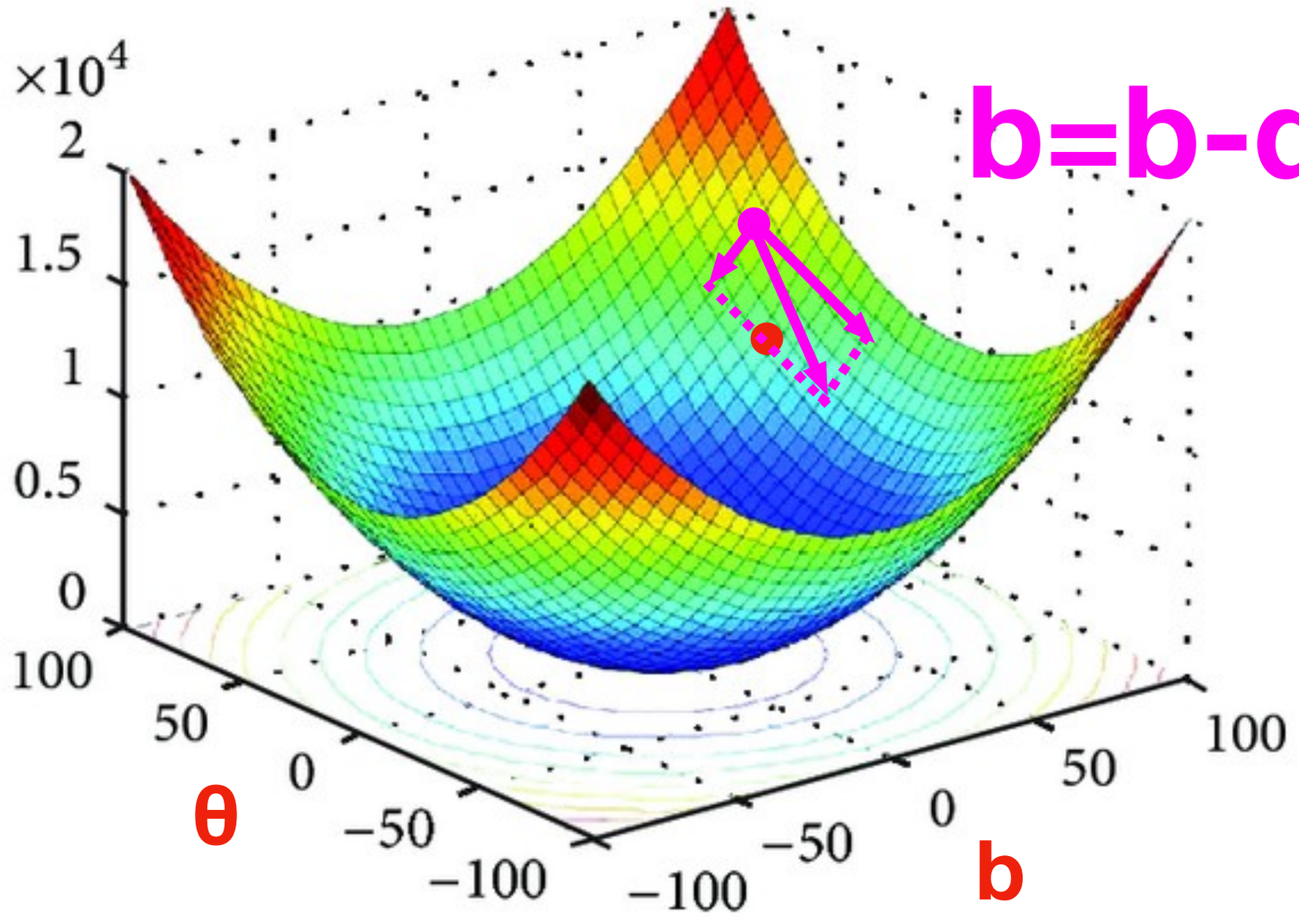
$$\theta = \theta - \alpha \frac{\partial J}{\partial \theta}$$

$$b = b - \alpha \frac{\partial J}{\partial b}$$



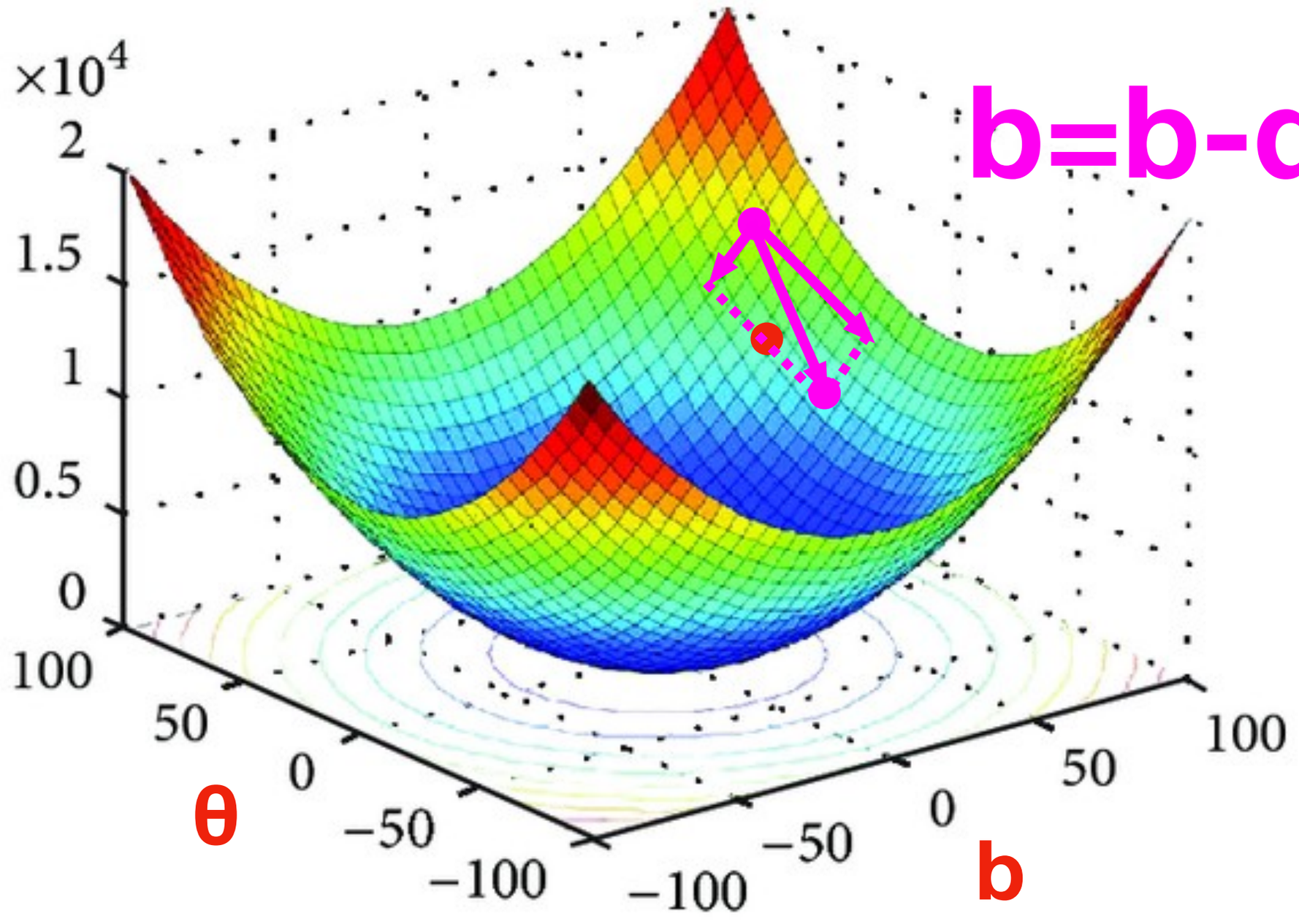
$$\theta = \theta - \alpha \frac{\partial J}{\partial \theta}$$

$$b = b - \alpha \frac{\partial J}{\partial b}$$



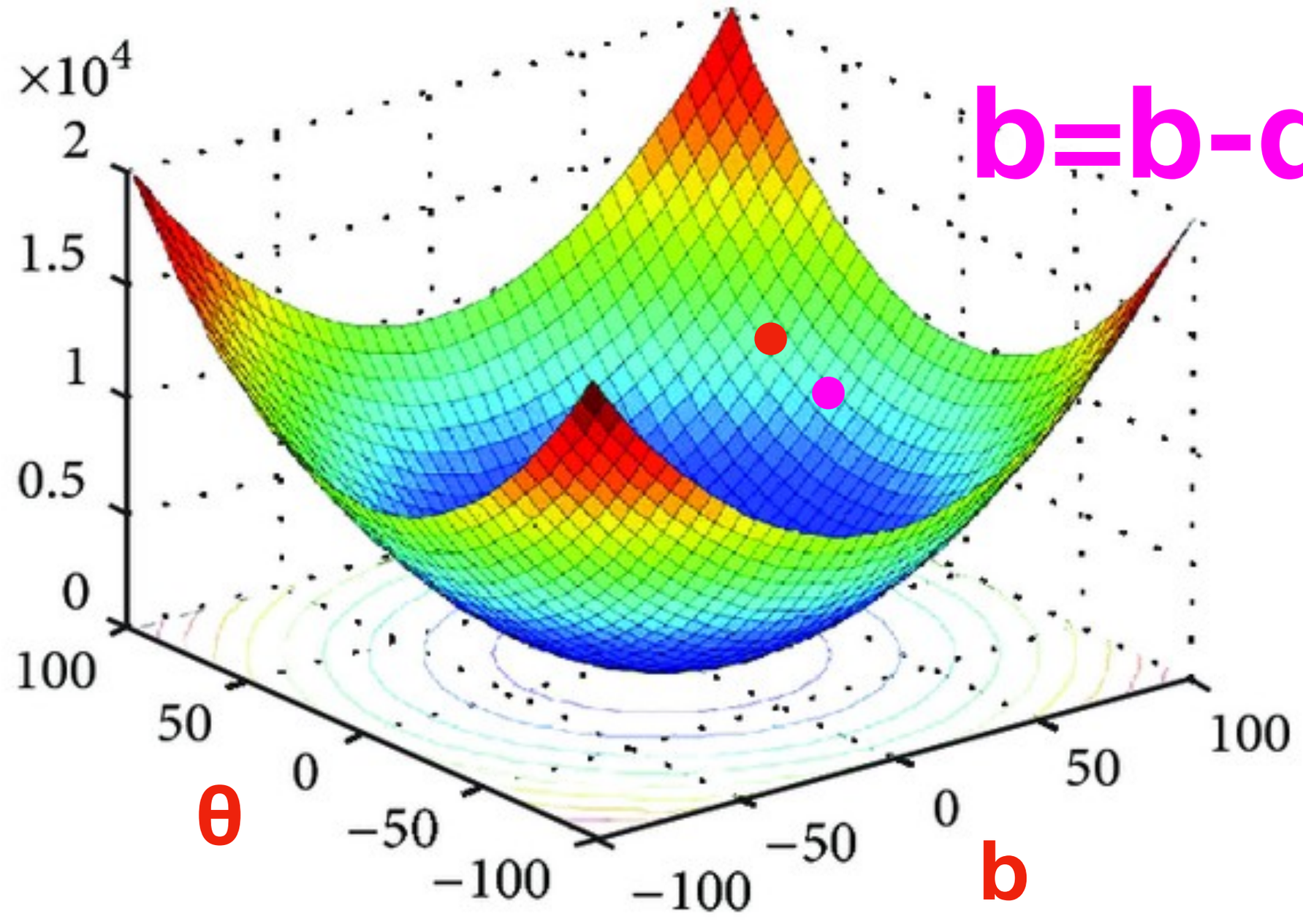
$$\theta = \theta - \alpha \frac{\partial J}{\partial \theta}$$

$$b = b - \alpha \frac{\partial J}{\partial b}$$

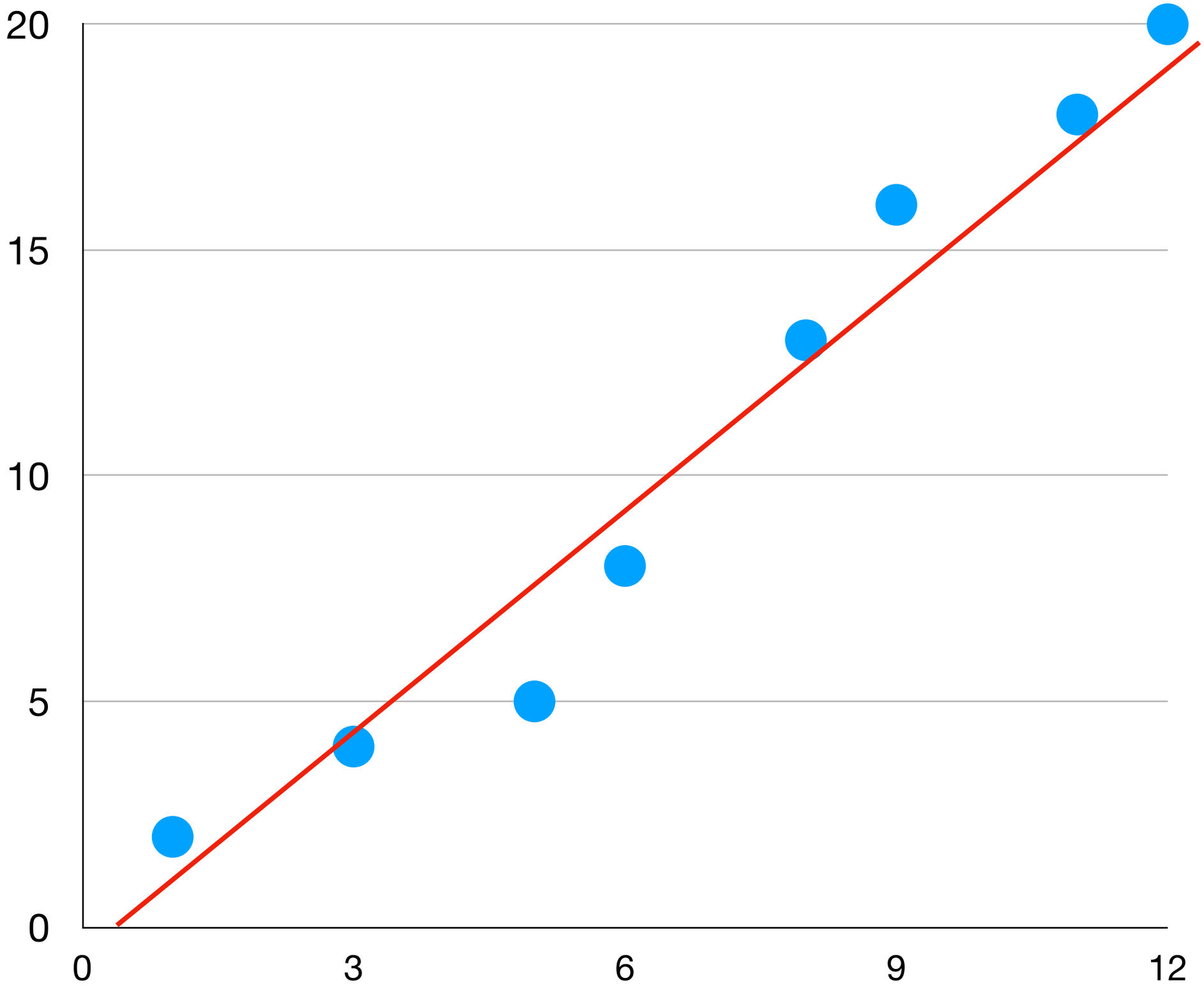


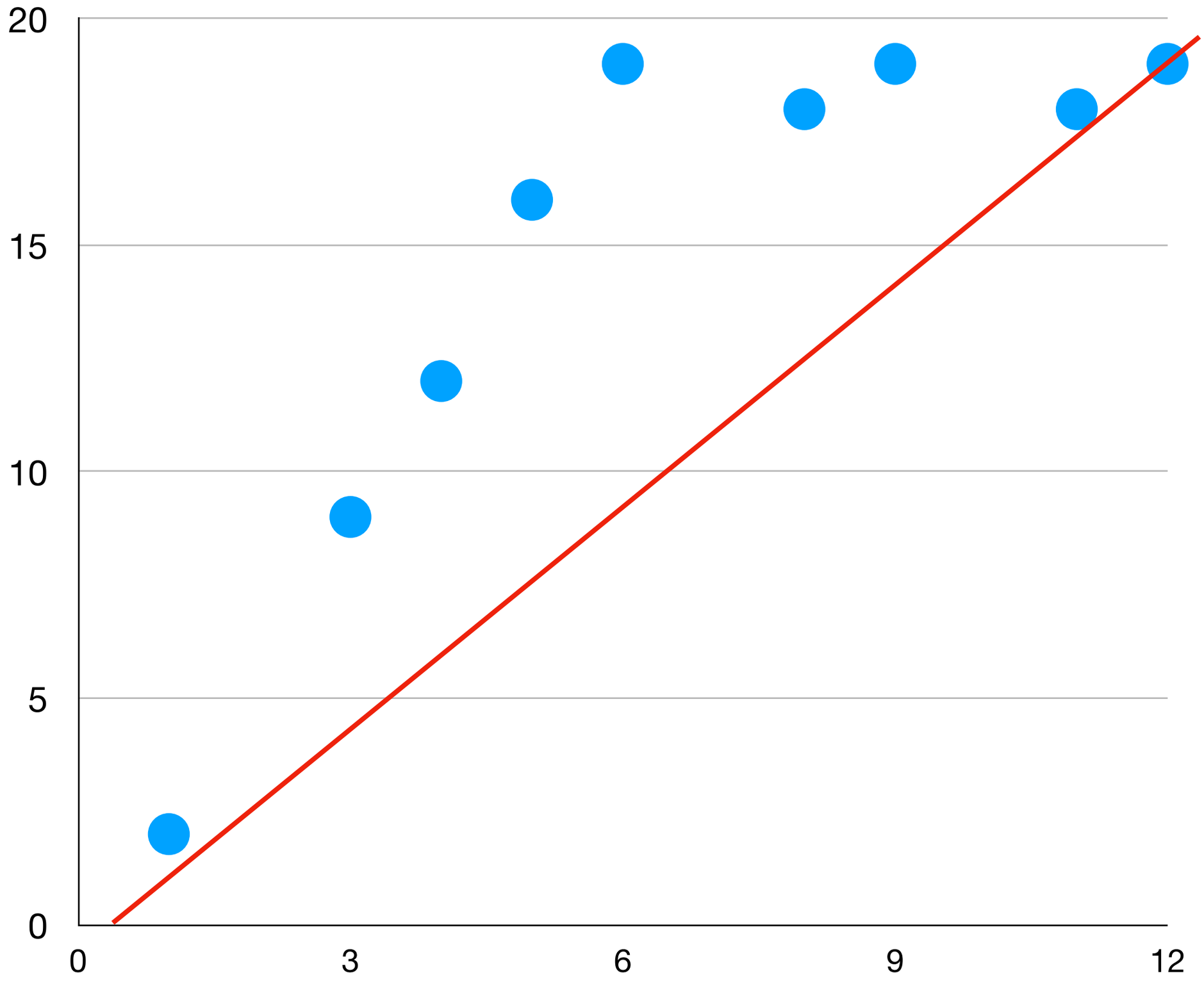
$$\theta = \theta - \alpha \frac{\partial J}{\partial \theta}$$

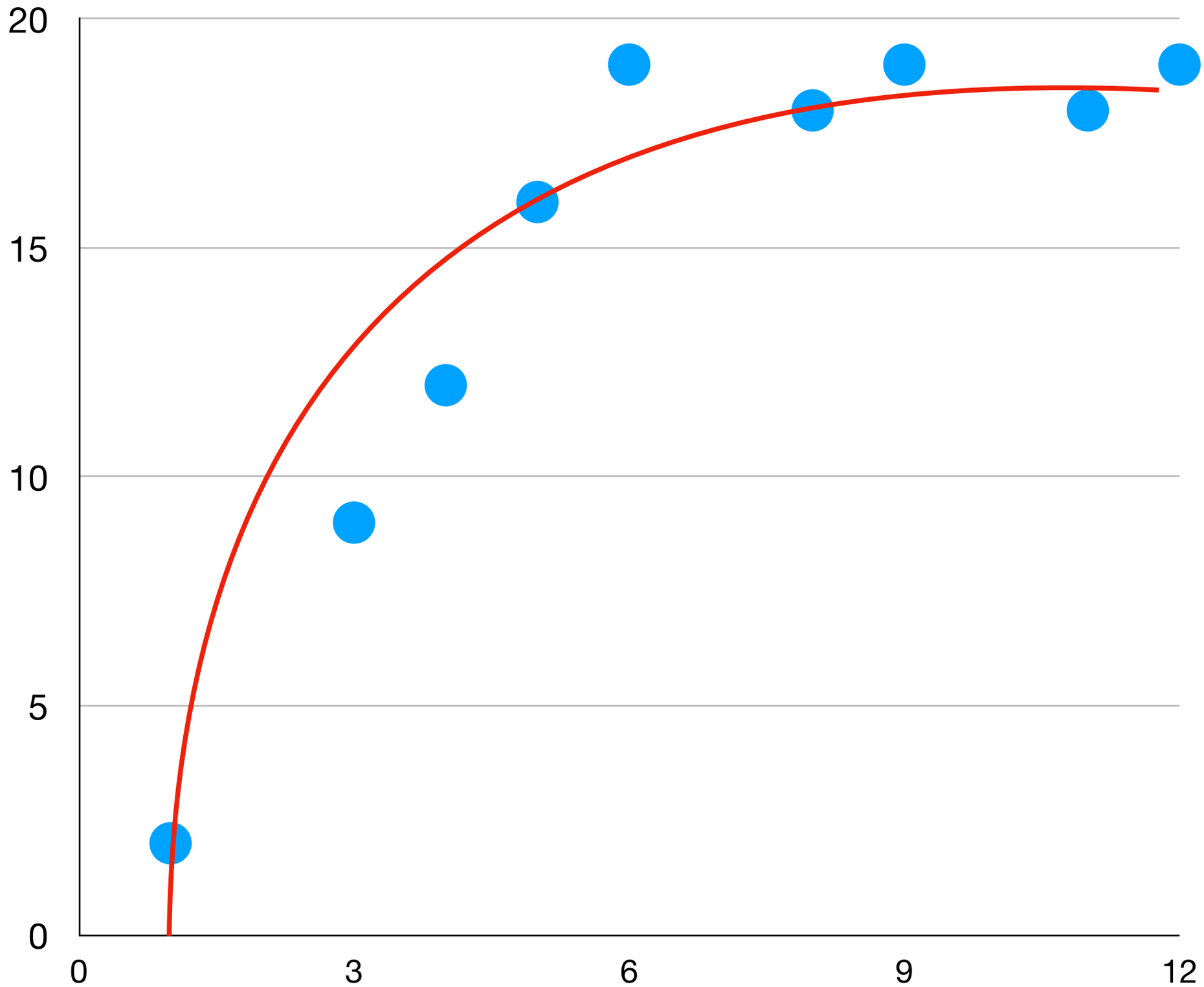
$$b = b - \alpha \frac{\partial J}{\partial b}$$



Steepest Descent


20
15
10
5
0
0
3
6
9
12


20
15
10
5
0
0
3
6
9
12


20
15
10
5
0
0
3
6
9
12