

1.4)

epoch 2:

$$\text{Sample 1: } \hat{y}_1 = 0.4(1) + 0.25(1) + 0.25 = 0.9$$

$$S2: \hat{y}_2 = 1.3$$

$$e_1 = 0.9 - 2 = -1.1$$

$$e_2 = 1.3 - 2 = -1.7$$

$$\frac{\partial L}{\partial w_1} = \frac{1}{2} (-1.1(1) - 1.7(2)) = -2.25$$

$$\frac{\partial L}{\partial w_2} = \frac{1}{2} (-1.1(1) - 1.7(1)) = -1.4$$

$$\frac{\partial L}{\partial b} = -1.4$$

$$\text{update: } w_1^{(2)} = 0.4 - 0.1(-2.25) = 0.625$$

$$w_2^{(2)} = 0.39$$

$$b^{(2)} = 0.39$$

store
67

epoch 3:

$$S1: \hat{y}_1 = 0.625 + 0.29 + 0.29 = 1.405$$

$$S2: \hat{y}_2 = 2(0.625) + 2 + 0.29 = 2.03$$

$$e_1 = -0.595$$

$$e_2 = -0.97$$

$$\frac{\partial L}{\partial w_1} = -1.2675 \quad \frac{\partial L}{\partial w_2} = -0.7826 \quad \frac{\partial L}{\partial b} = -0.7826$$

$$w_1^{(2)} = 0.75175 \quad w_2^{(2)} = b^{(2)} = 0.46825$$

$$1.5) \quad L_1 = \frac{1}{2} [(0-2)^2 + (0-3)^2] = 6.5$$

$$L_2 = \frac{1}{2} (e_1^2 + e_2^2) = \frac{1}{2} ((1.1)^2 + (1.7)^2) = 1.985$$

$$L_2 = 0.648$$

Loss is decreasing with each epoch