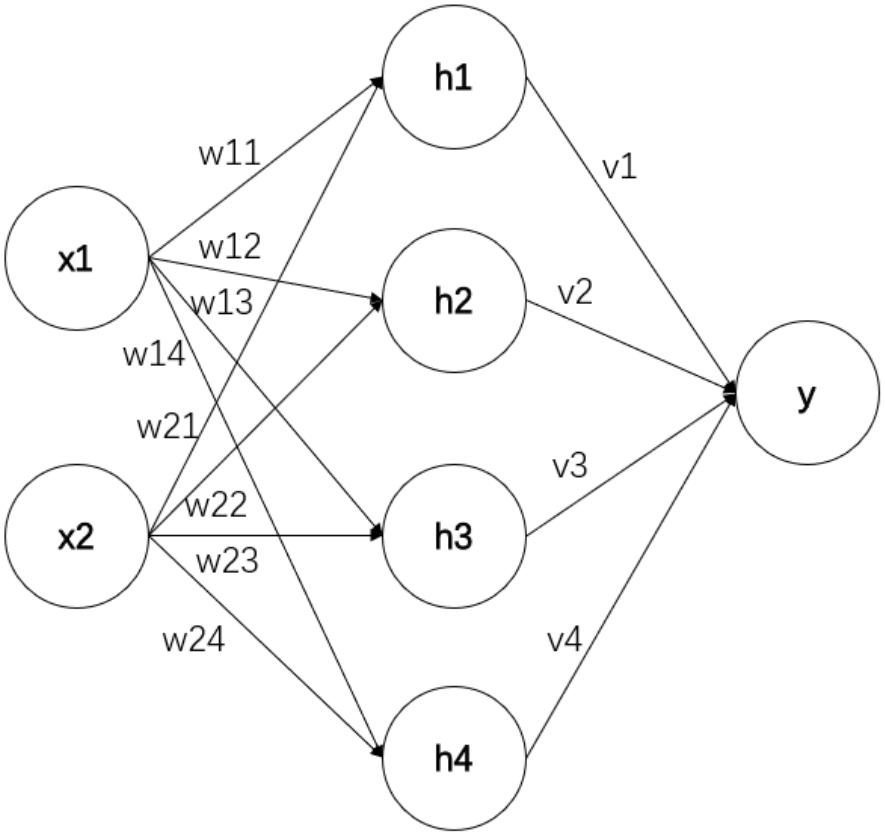
1.1



1.2

$$y = \delta(v1h1 + v2h2 + v3h3 + v4h4 + c)$$
$$h1 = max(0, w11x1 + w21x2 + b1)$$
$$h2 = max(0, w12x1 + w22x2 + b2)$$
$$h3 = max(0, w13x1 + w23x2 + b3)$$
$$h4 = max(0, w14x1 + w24x2 + b4)$$

2.1

$$\frac{\partial f}{\partial x} = -3x^2 + 100x - 200y^2$$
$$\frac{\partial f}{\partial y} = 800y^3 - 400xy$$

3.1

$$\frac{dL}{d\hat{y}} = -\left(\frac{y_i}{\hat{y}_i} - \frac{1-y_i}{1-\hat{y}_i}\right)$$

$$\frac{\partial L}{\partial w_1} = \frac{dL}{d\hat{y}}\text{out}_1$$

$$\frac{\partial L}{\partial w_2} = \frac{dL}{d\hat{y}}\text{out}_2$$

$$\frac{\partial L}{\partial c_1} = \frac{dL}{d\hat{y}}\frac{\partial \hat{y}}{\partial \text{out}_1}\frac{d\text{out}_1}{d\text{in}_1}\frac{\partial \text{in}_1}{\partial c_1}$$

$$\frac{\partial L}{\partial c_2} = \frac{dL}{d\hat{y}}\frac{\partial \hat{y}}{\partial \text{out}_2}\frac{d\text{out}_2}{d\text{in}_2}\frac{\partial \text{in}_2}{\partial c_2}$$

$$\frac{\partial L}{\partial W_{11}} = \frac{dL}{d\hat{y}}\frac{\partial \hat{y}}{\partial \text{out}_1}\frac{d\text{out}_1}{d\text{in}_1}\frac{\partial \text{in}_1}{\partial W_{11}}$$

$$\frac{\partial L}{\partial W_{21}} = \frac{dL}{d\hat{y}}\frac{\partial \hat{y}}{\partial \text{out}_1}\frac{d\text{out}_1}{d\text{in}_1}\frac{\partial \text{in}_1}{\partial W_{21}}$$

$$\frac{\partial L}{\partial W_{12}} = \frac{dL}{d\hat{y}}\frac{\partial \hat{y}}{\partial \text{out}_2}\frac{d\text{out}_2}{d\text{in}_2}\frac{\partial \text{in}_2}{\partial W_{12}}$$

$$\frac{\partial L}{\partial W_{22}} = \frac{dL}{d\hat{y}}\frac{\partial \hat{y}}{\partial \text{out}_2}\frac{d\text{out}_2}{d\text{in}_2}\frac{\partial \text{in}_2}{\partial W_{22}}$$