EECS 504 Computer Vision HW4

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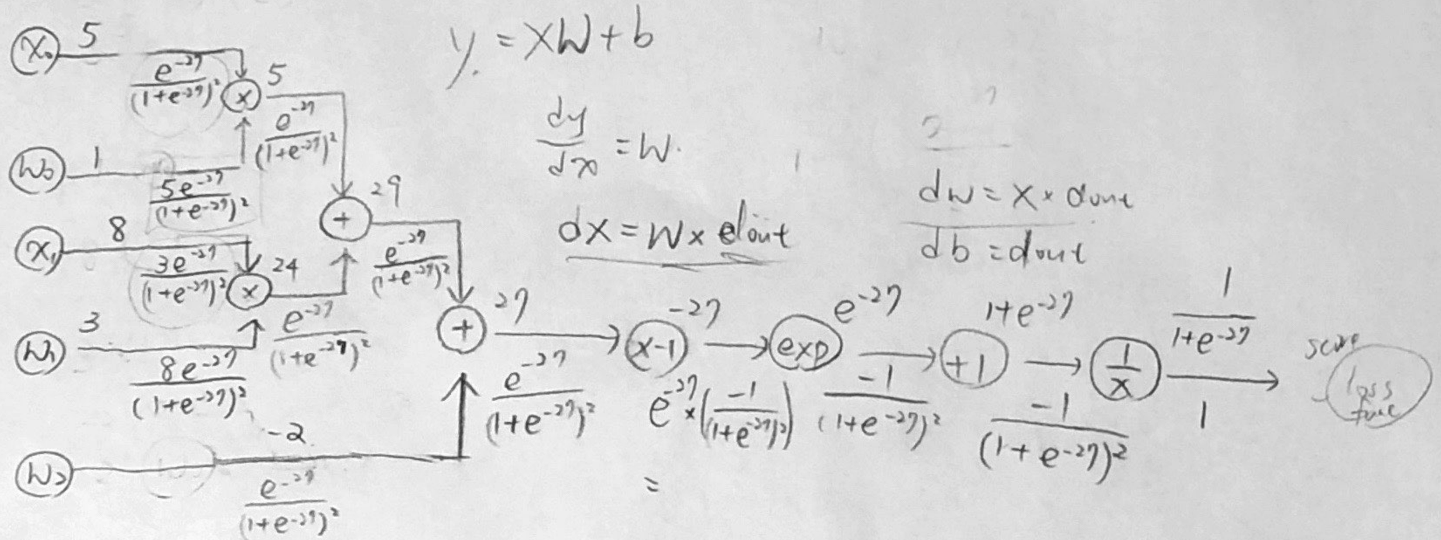
4.1

4.1 (a)(b)(c)



$$f(x) = e^x, \quad \frac{df}{dx} = e^x \qquad f(x) = ax, \quad \frac{df}{dx} = a.$$

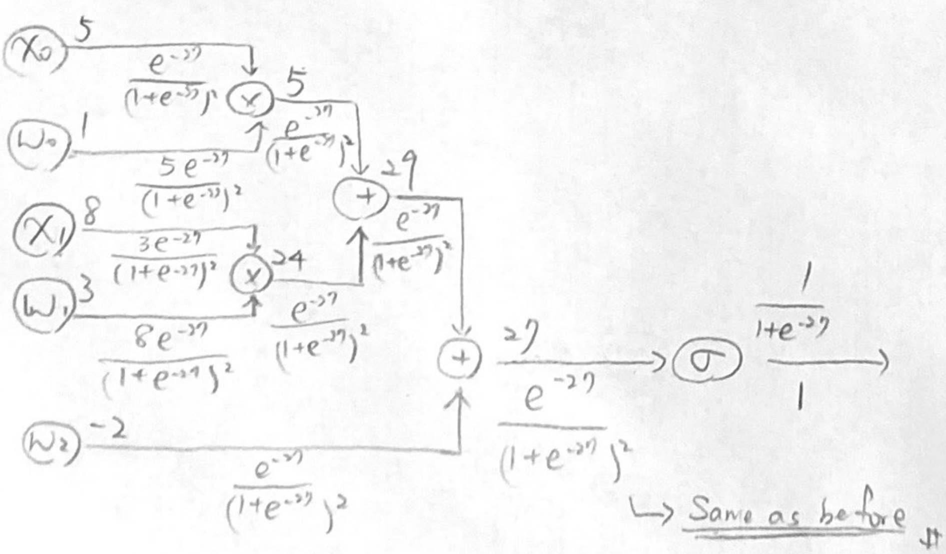
$$f(x) = \frac{1}{x}, \quad \frac{df}{dx} = \frac{-1}{x^2} \qquad f(x) = c + x, \quad \frac{df}{dx} = 1$$

(d)

$$\sigma = \frac{1}{1+e^{-x}} \qquad \frac{\partial \sigma}{\partial x} = -\frac{1}{(1+e^{-x})^2} \times e^{-x} \times (-1) = \frac{e^{-x}}{(1+e^{-x})^2} = \frac{1}{(1+e^{-x})} \times \frac{e^{-x}}{(1+e^{-x})}$$

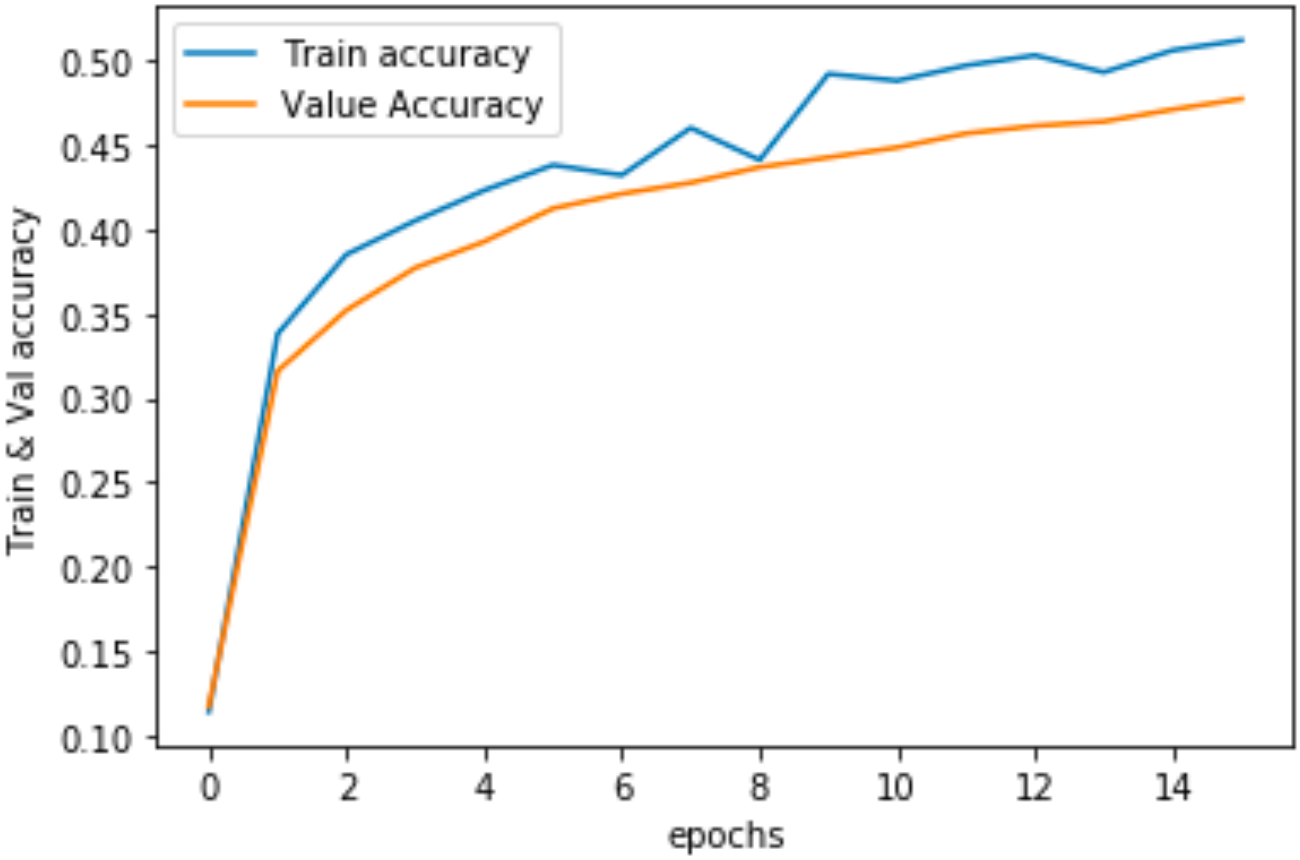
$$= \sigma \times \frac{1+e^{-x}-1}{1+e^{-x}} = \sigma \times (1-\sigma)$$

(e)



4.2

The train and val accuracy increases when the epoch increases

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(Iteration 1 / 2340) loss: 2.294693
(Epoch 0 / 15) train acc: 0.114000; val_acc: 0.117000
(Epoch 1 / 15) train acc: 0.338000; val_acc: 0.315900
(Epoch 2 / 15) train acc: 0.385000; val_acc: 0.352000
(Epoch 3 / 15) train acc: 0.405000; val_acc: 0.377100
(Epoch 4 / 15) train acc: 0.423000; val_acc: 0.392600
(Epoch 5 / 15) train acc: 0.438000; val_acc: 0.412300
(Epoch 6 / 15) train acc: 0.432000; val_acc: 0.421000
(Iteration 1001 / 2340) loss: 1.580189
(Epoch 7 / 15) train acc: 0.460000; val_acc: 0.427500
(Epoch 8 / 15) train acc: 0.441000; val_acc: 0.436700
(Epoch 9 / 15) train acc: 0.492000; val_acc: 0.442500
(Epoch 10 / 15) train acc: 0.488000; val_acc: 0.448400
(Epoch 11 / 15) train acc: 0.497000; val_acc: 0.456700
(Epoch 12 / 15) train acc: 0.503000; val_acc: 0.461200
(Iteration 2001 / 2340) loss: 1.427029
(Epoch 13 / 15) train acc: 0.493000; val_acc: 0.463800
(Epoch 14 / 15) train acc: 0.506000; val_acc: 0.470900
(Epoch 15 / 15) train acc: 0.512000; val_acc: 0.477200
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