



deeplearning.ai

## Regularizing your neural network

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### Why regularization reduces overfitting

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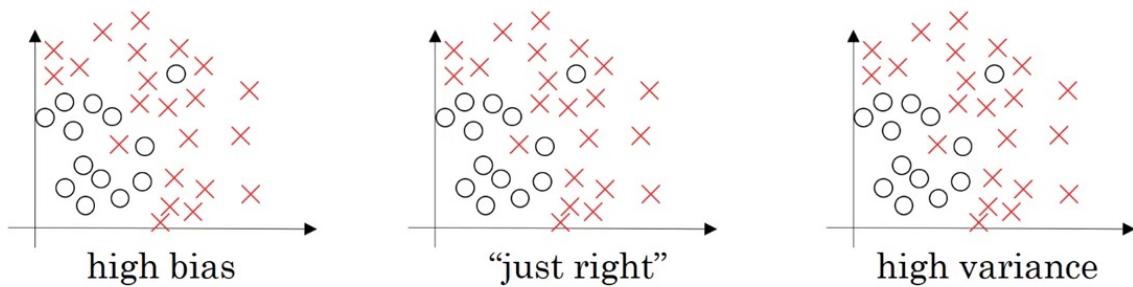
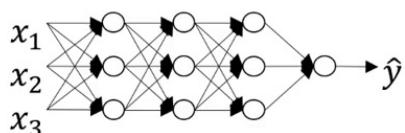
Regularizing your  
neural network

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Why regularization  
reduces overfitting

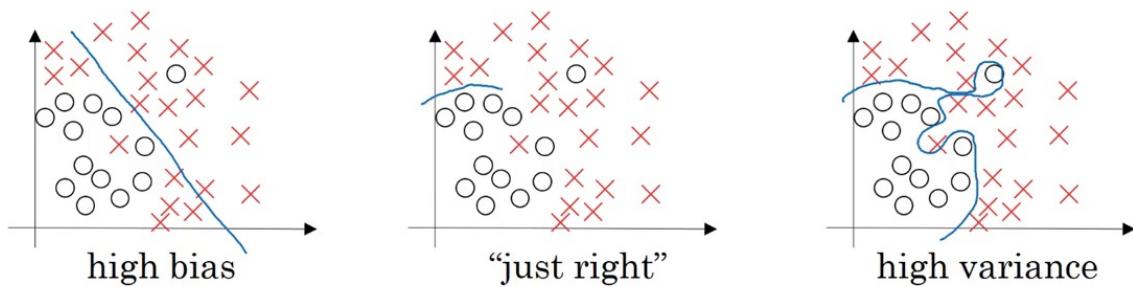
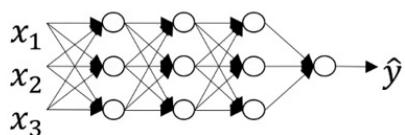
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## How does regularization prevent overfitting?



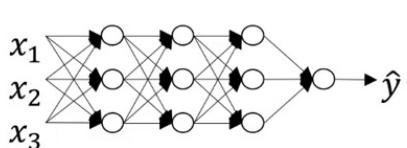
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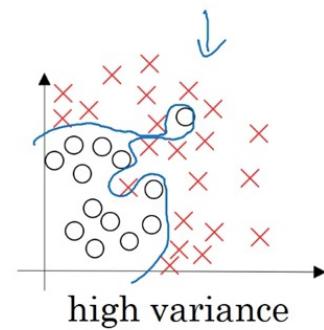
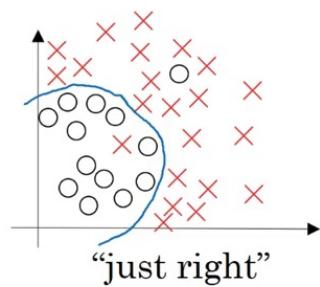
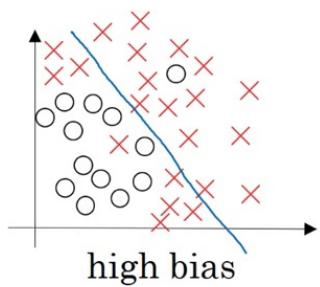


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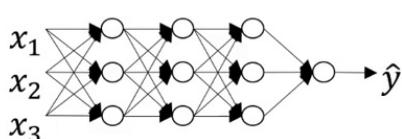


$\mathcal{J}(\omega^{(1)}, b)$

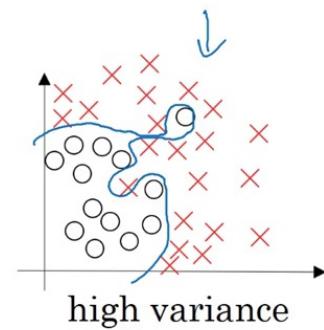
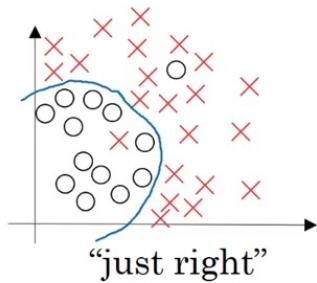
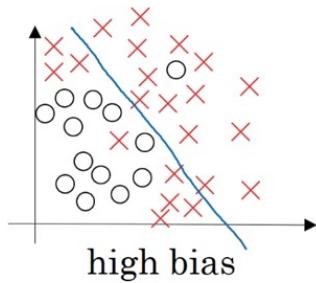


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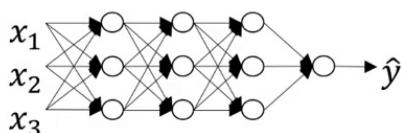


$$\mathcal{J}(\boldsymbol{\omega}^{(m)}, b^{(m)}) = \frac{1}{m} \sum_{i=1}^m L(y_i^{(i)}, \hat{y}_i^{(i)}) + \frac{\lambda}{2m} \sum_{l=1}^L \|\boldsymbol{\omega}^{(l)}\|$$



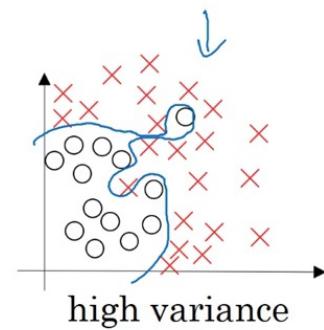
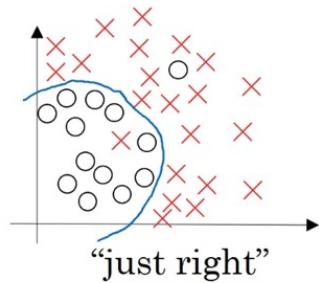
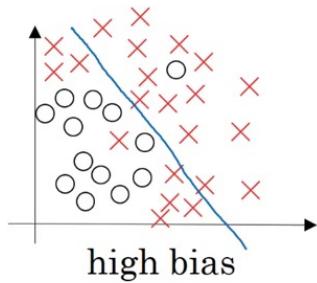
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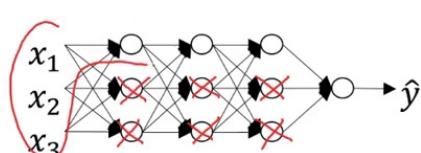
$$J(\omega^{(0)}, b^{(0)}) = \frac{1}{m} \sum_{i=1}^m L(y^{(i)}, \hat{y}^{(i)}) + \frac{\lambda}{2m} \sum_{l=1}^L \|\omega^{(l)}\|_F^2$$

$\omega$



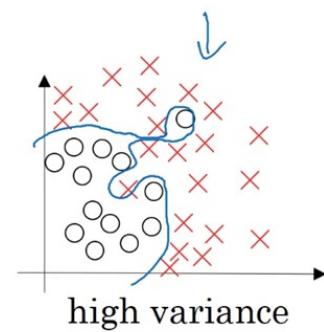
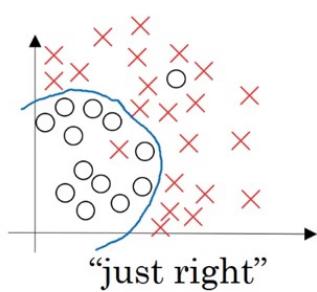
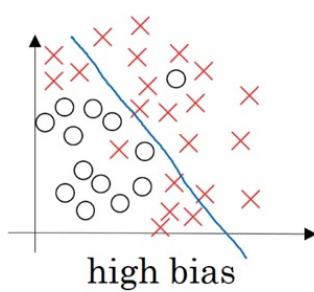
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## How does regularization prevent overfitting?



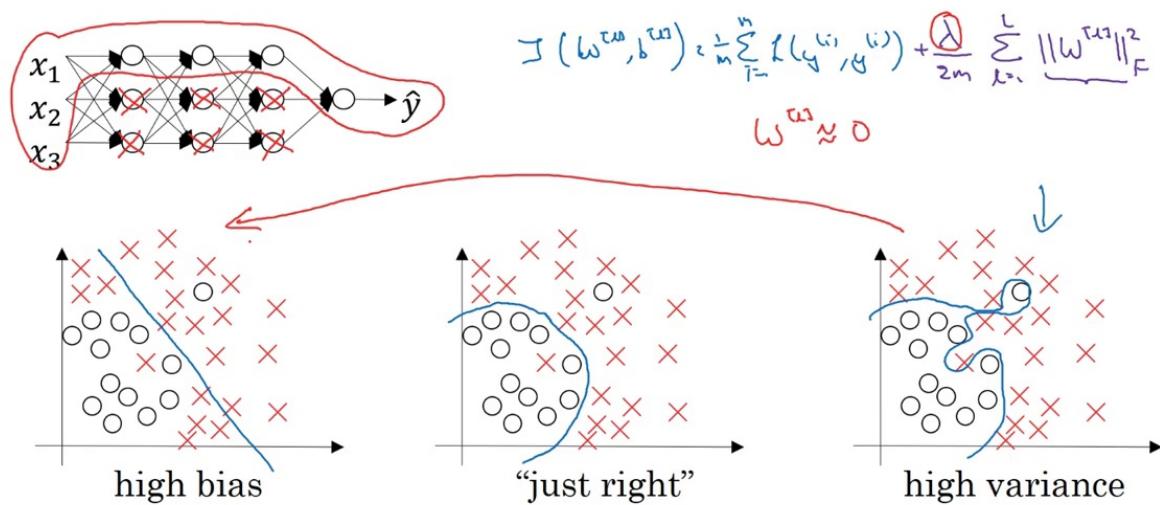
$$J(\omega^{(m)}, b^{(m)}) = \frac{1}{m} \sum_{i=1}^m L(y_i^{(i)}, \hat{y}_i^{(i)}) + \frac{\lambda}{2m} \sum_{l=1}^L \|\omega^{(l)}\|_F^2$$

$\omega^{(l)} \approx 0$



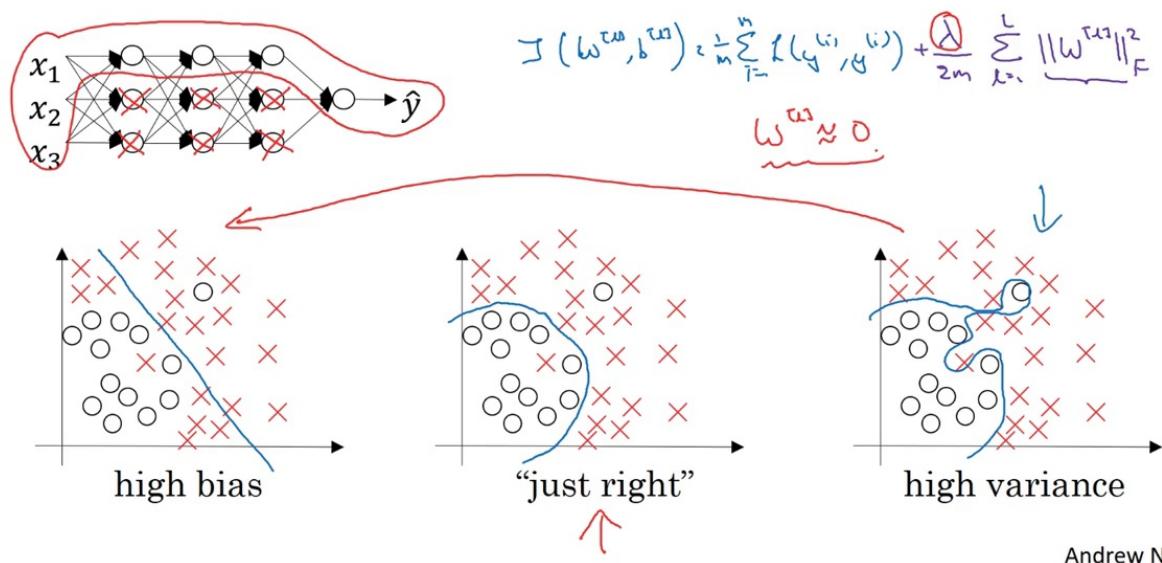
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## How does regularization prevent overfitting?

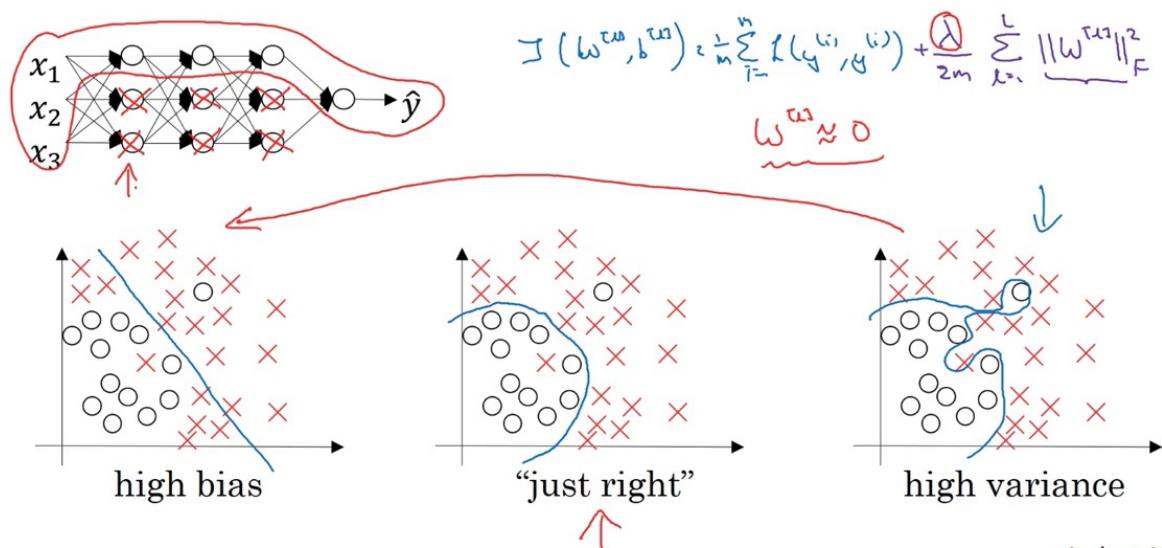


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## How does regularization prevent overfitting?

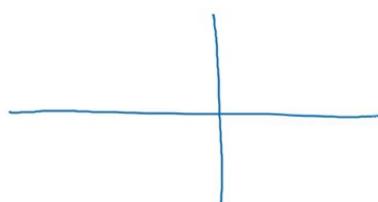


## How does regularization prevent overfitting?



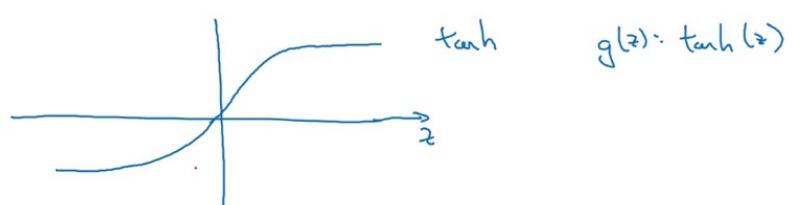
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How does regularization prevent overfitting?



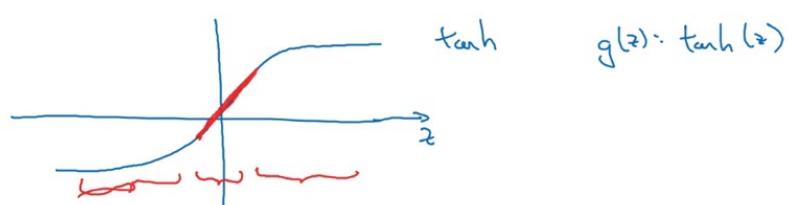
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How does regularization prevent overfitting?



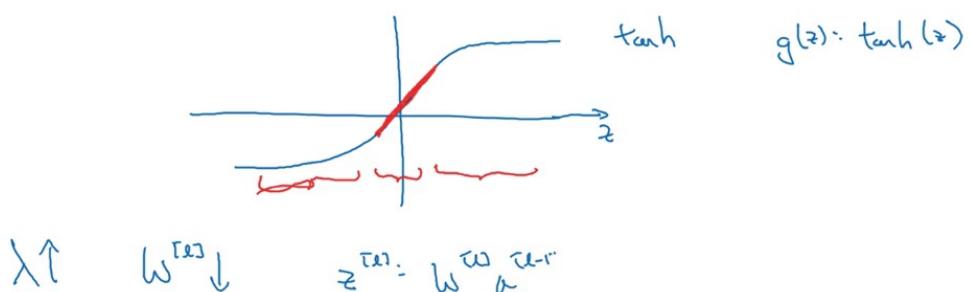
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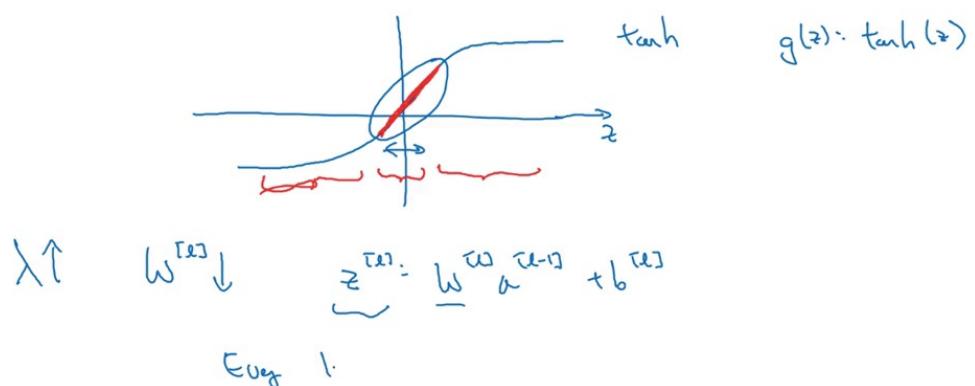
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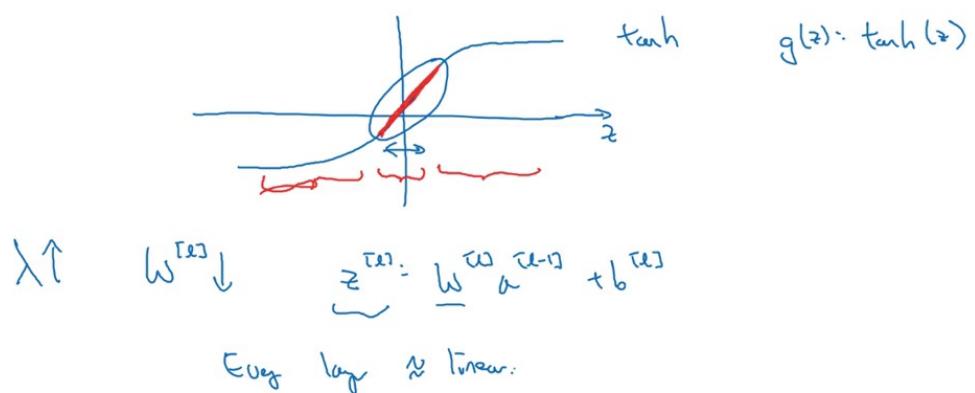
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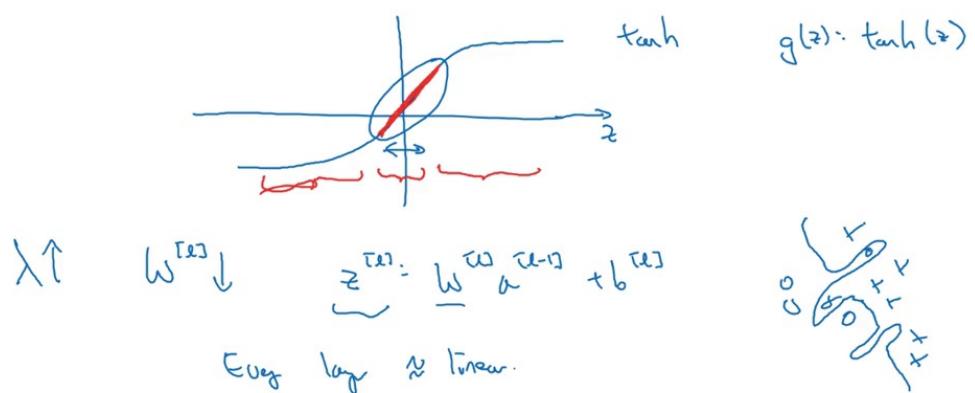
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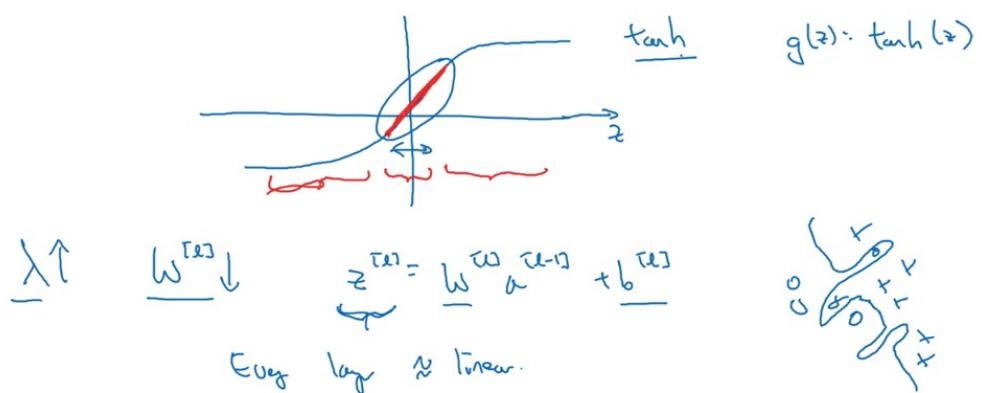
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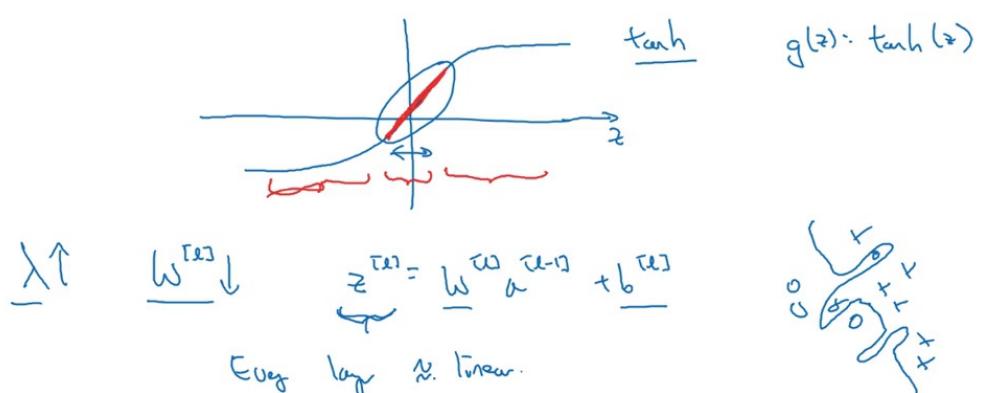
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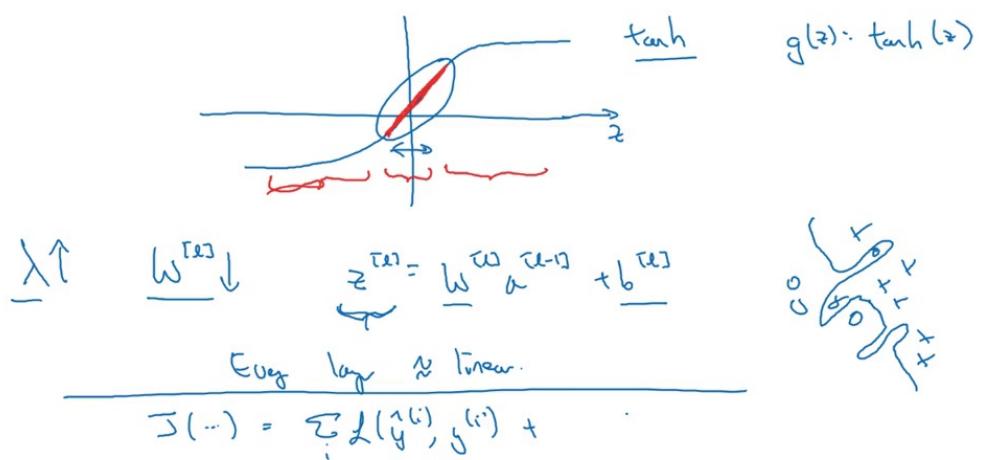
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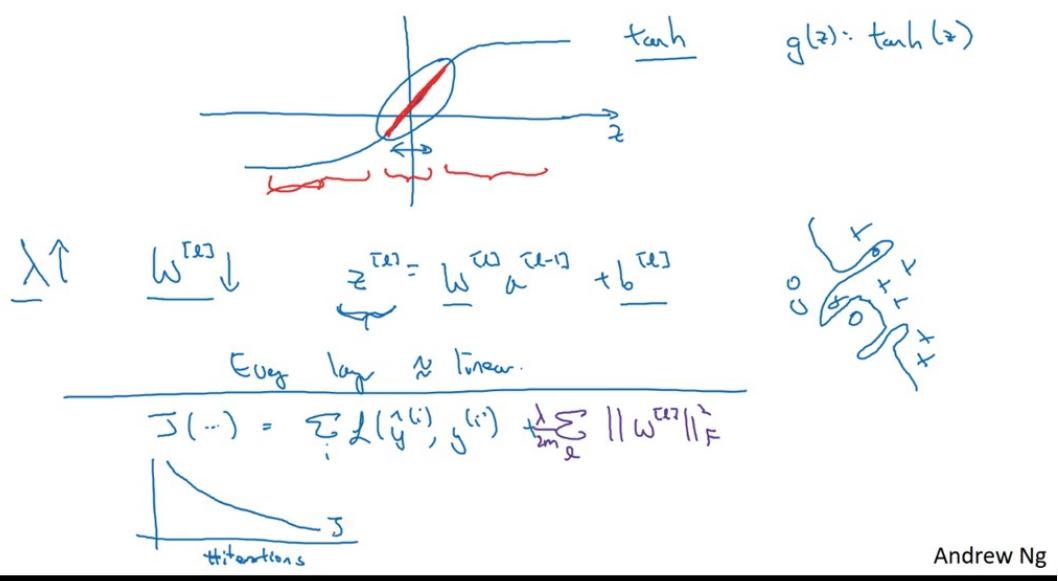
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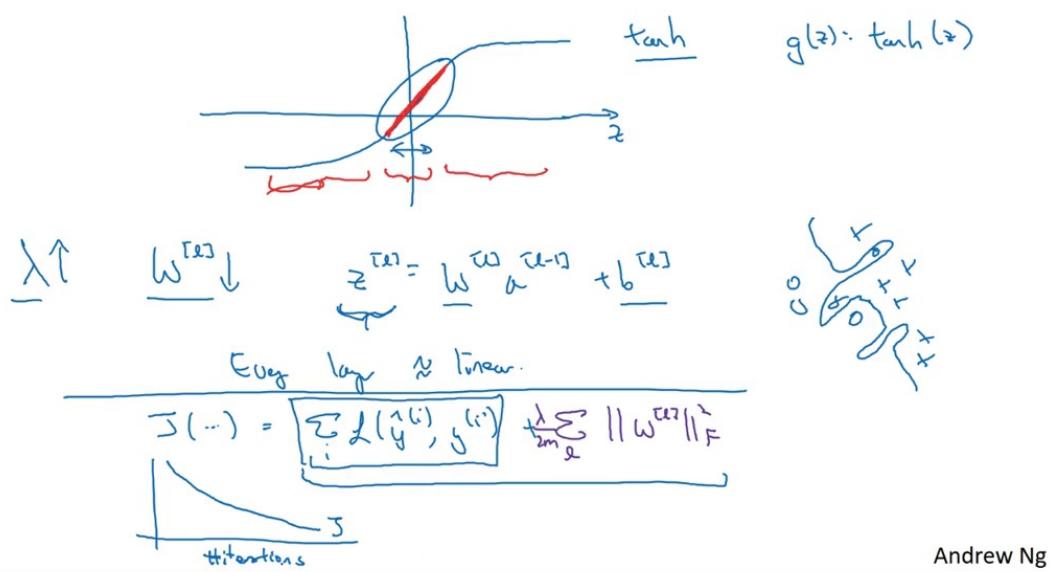


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## How does regularization prevent overfitting?



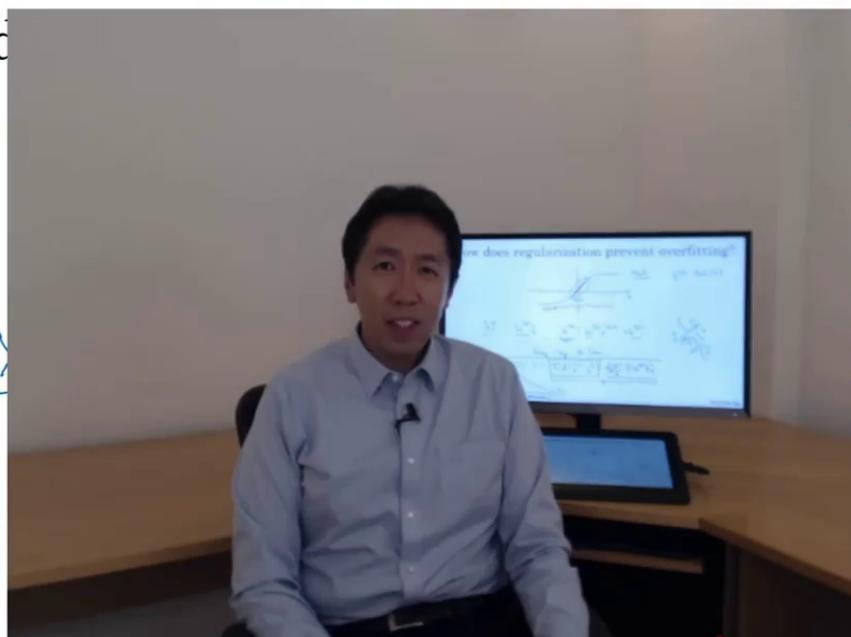
## How does regularization prevent overfitting?



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How does regularization prevent overfitting?

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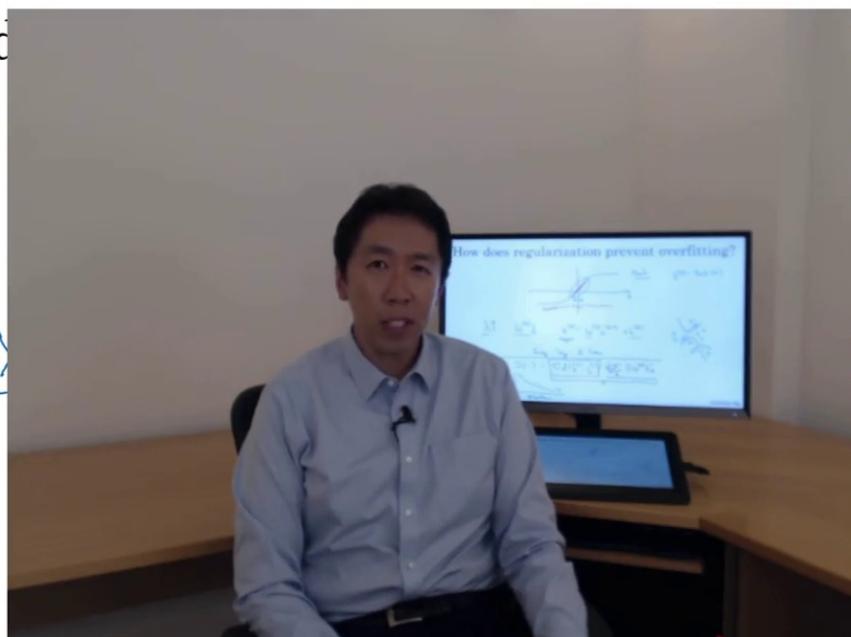


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How do we prevent overfitting?

lambda (<math>\lambda</math>)



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