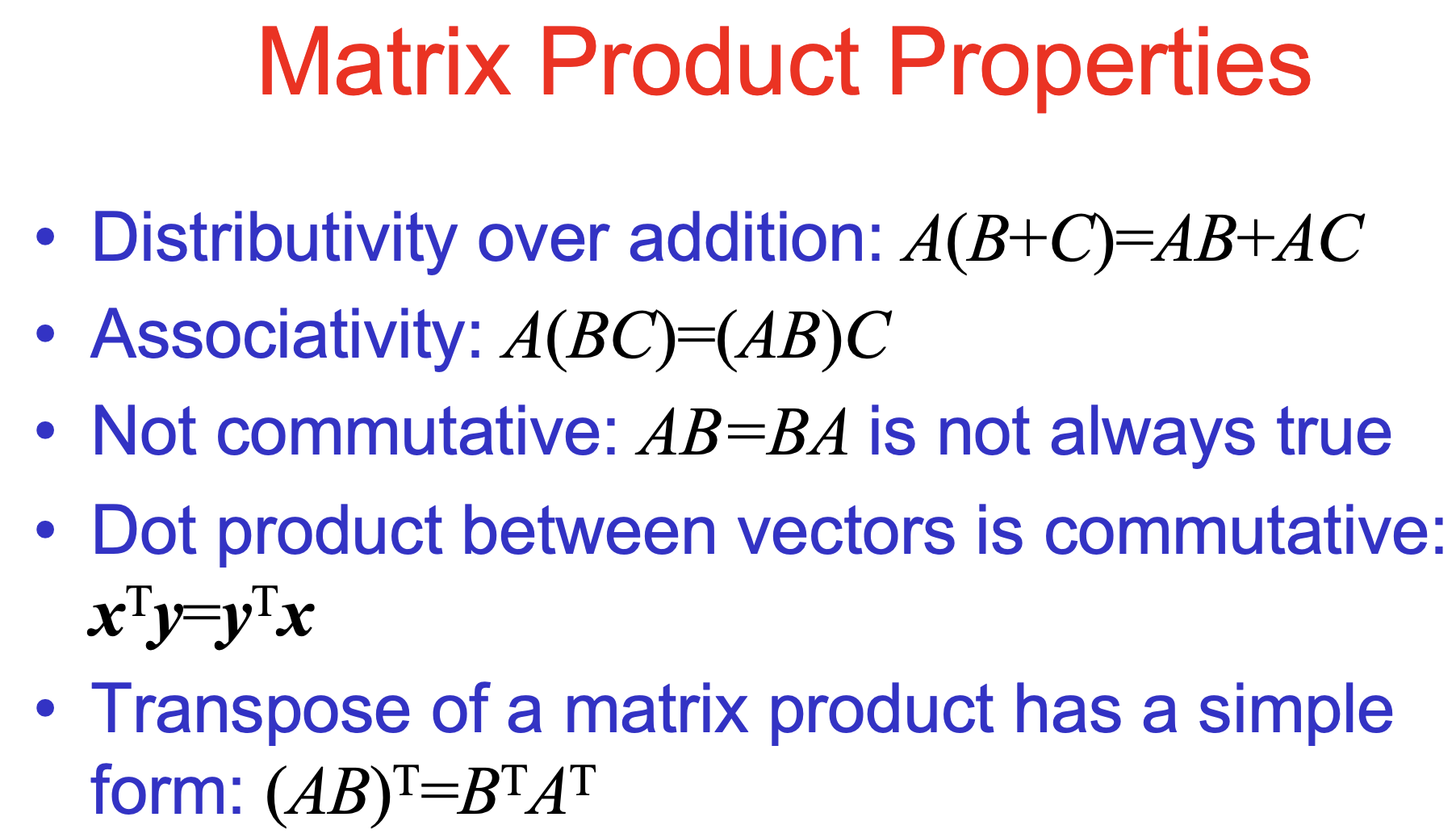
Notes for CS146 Midterm



A math equations and formulas

Description automatically generated with medium confidence

How to carry out linear regression:

A screenshot of a math problem

Description automatically generated

A screenshot of a computer

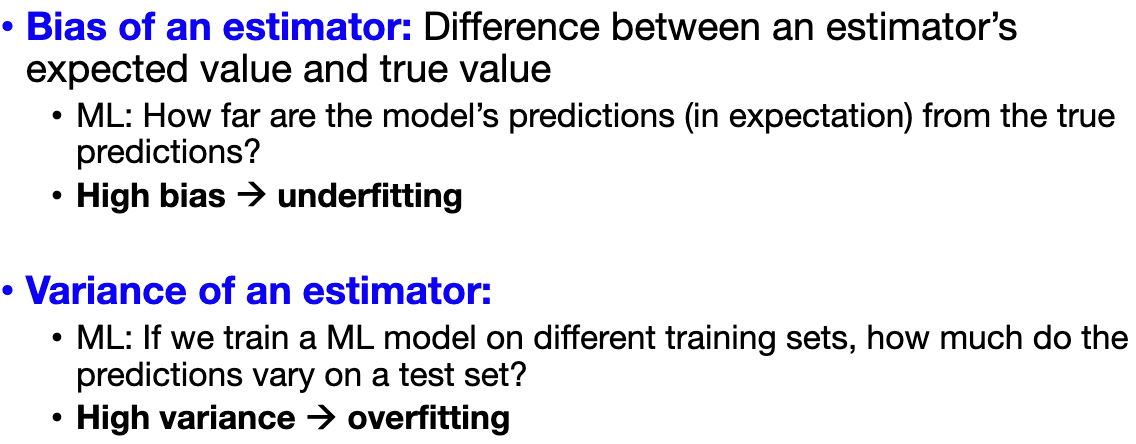
Description automatically generated

**A math problem with equations

Description automatically generated with medium confidence**

**A math problem with numbers

Description automatically generated with medium confidence**



A white paper with black text and black text

Description automatically generated

A close up of a number

Description automatically generated

A math equation with numbers and a arrow

Description automatically generated with medium confidence

A group of mathematical equations

Description automatically generated

A black and white square with a square and a number

Description automatically generated with medium confidence

A white paper with black text

Description automatically generated

A diagram of mathematical equations

Description automatically generated

Advantages of SGD: Scales to large datasets  
• Memory efficient: single example is processed at a time  
• Computationally cheap: ! " time/step (v.s. ! #" for GD)  
• Implicit regularization (advanced ML course)  
• Disadvantages of SGD  
• High noise in the gradient. Can take many updates to converge  
• Cannot exploit modern hardware optimized for matrix

Operations

A math equations and graphs

Description automatically generated with medium confidence

A diagram of mathematical equations

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A screenshot of a math problem

Description automatically generated

A white paper with black text

Description automatically generated

A math equations and formulas

Description automatically generated with medium confidence

A math equations and formulas

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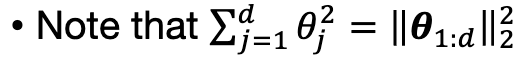
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Expected square error: Bias\*\*2 + variance

**• Loss Regularization**: Method for preventing overfitting by automatically controlling the complexity of the learned hypothesis  
• Idea: penalize large values of !" during optimization  
• Can incorporate into the loss function  
• Works well when we have a lot of features, each that contributes a bit to predicting the label

A math equations on a white background

Description automatically generated



A close-up of mathematical equations

Description automatically generated

A number and mathematical symbols

Description automatically generated with medium confidence

A black and white text with numbers and symbols

Description automatically generated  
A math equations and formulas

Description automatically generated with medium confidence

A close-up of a sign

Description automatically generated

A math equations on a white background

Description automatically generated

A blue background with black text

Description automatically generated

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A math equations on a white background

Description automatically generated

Guaranteed to converge if data is linearly separable

A graph and diagram of a function

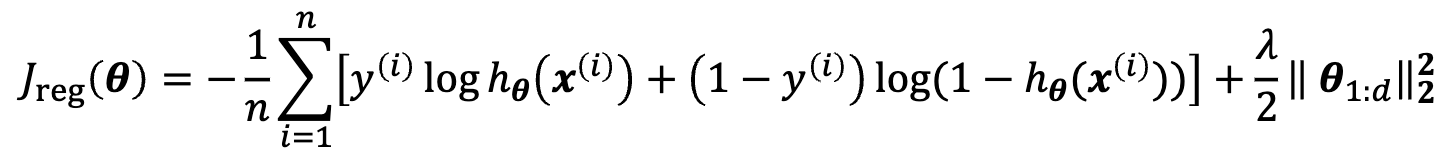
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A graph of values and values

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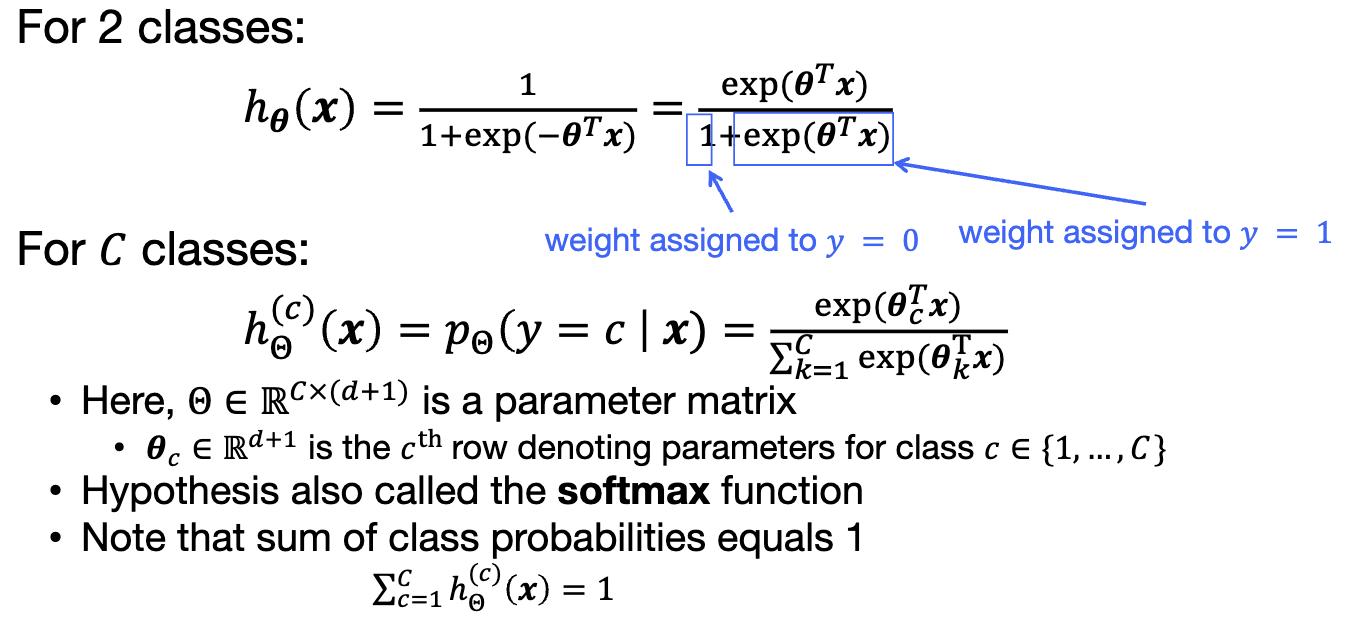
A screenshot of a math problem

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A close-up of a math problem

Description automatically generated



A math equations and formulas

Description automatically generated

A math equation with numbers and symbols

Description automatically generated

**Logistic Regression**  
• A probabilistic linear model for classification  
Loss function  
• Binary/softmax cross-entropy loss  
Basis Function, Optimization, Regularization  
• Analogous to linear regression

A math equations and formulas

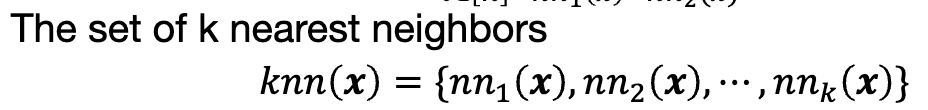
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How to measure distances for nearest neighbor:

A black and white text

Description automatically generated A black and white math symbols

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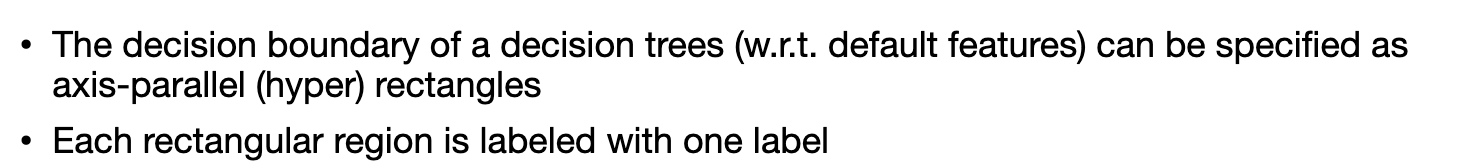


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Description automatically generated

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Description automatically generated



A screenshot of a computer

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A close-up of a text

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Description automatically generated

Entropy measures the level of impurity in a group of examples

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A group of mathematical equations

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Description automatically generated

A table with numbers and a number on it

Description automatically generated

A math equations and formulas

Description automatically generated with medium confidence

A graph with red and blue dots

Description automatically generated

A math problem with numbers and equations

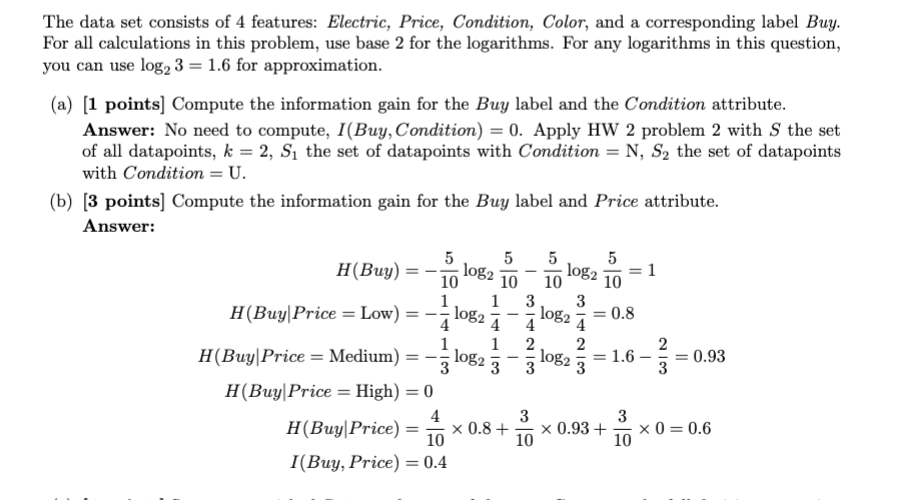
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A math equations with black letters

Description automatically generated with medium confidence

A math equations on a white background

Description automatically generated



A white sheet with black text

Description automatically generated

A paper with math equations

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