
LECTURE 4 TERM 2:

MSIN0097

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PREDICTIVE ANALYTICS Assignment Project Exam Help

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A P MOORE

MACHINE LEARNING JARGON

- Model
- Interpolating / Extrapolating
- Data Bias
- Noise / Outliers
- Learning algorithm
- Inference algorithm
- Supervised learning
- Unsupervised learning
- Classification
- Regression
- Clustering
- Decomposition
- Parameters
- Optimisation
- Training data
- Testing data
- Error metric
- Linear model
- Parametric model
- Model variance
- Model bias
- Model generalization
- Overfitting
- Goodness-of-fit
- Hyper-parameters
- Failure modes
- Confusion matrix
- Data density
- Partition
- Hidden parameter
- Feature space
- High dimensional space
- Low dimensional space
- Separable data ←
- Manifold / Decision surface
- Hyper cube / volume / plane

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D. DECOMPOSITION

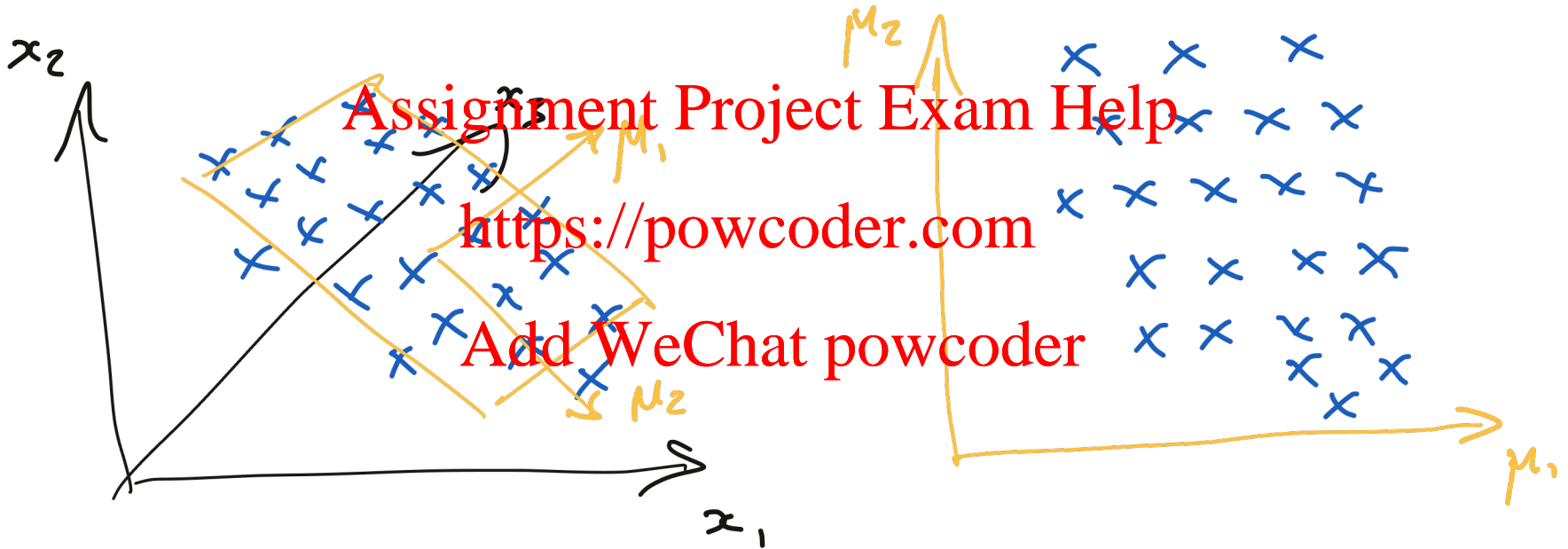
PROJECTION METHODS

Model requirements

Decomposition

$$x \in [-\infty, \infty]$$

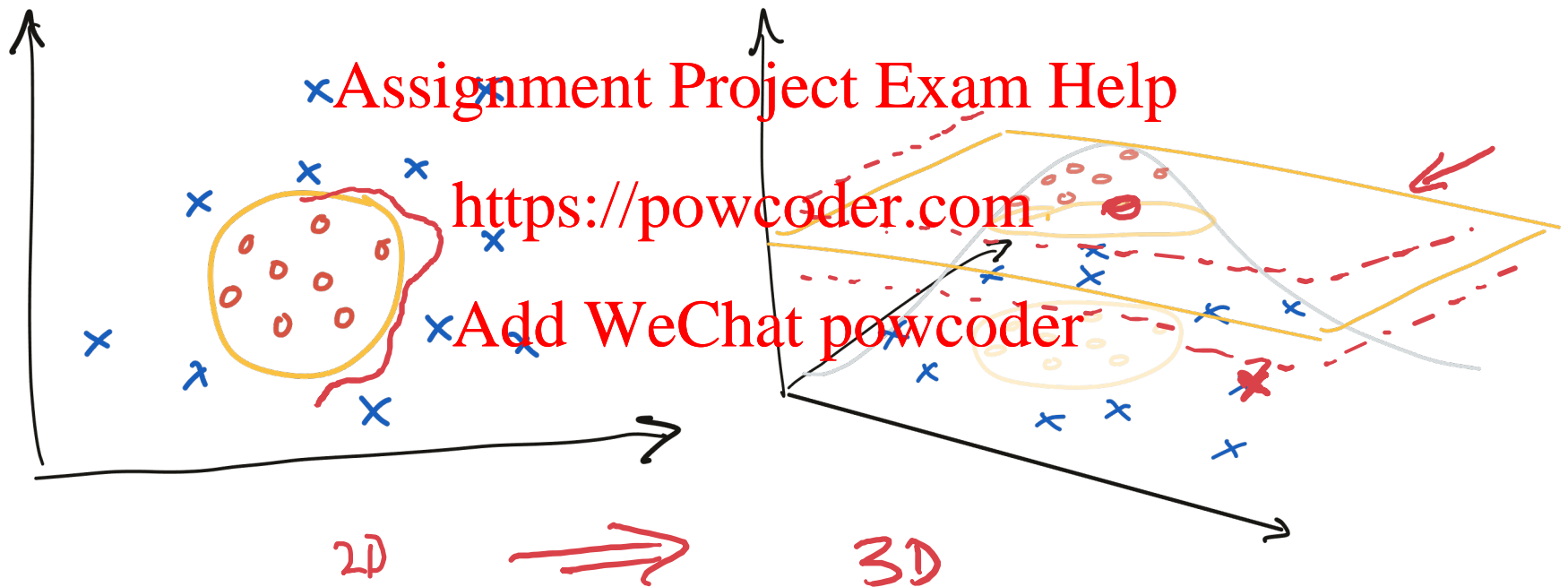
$$y \in [-\infty, \infty]$$



Dimensionality reduction

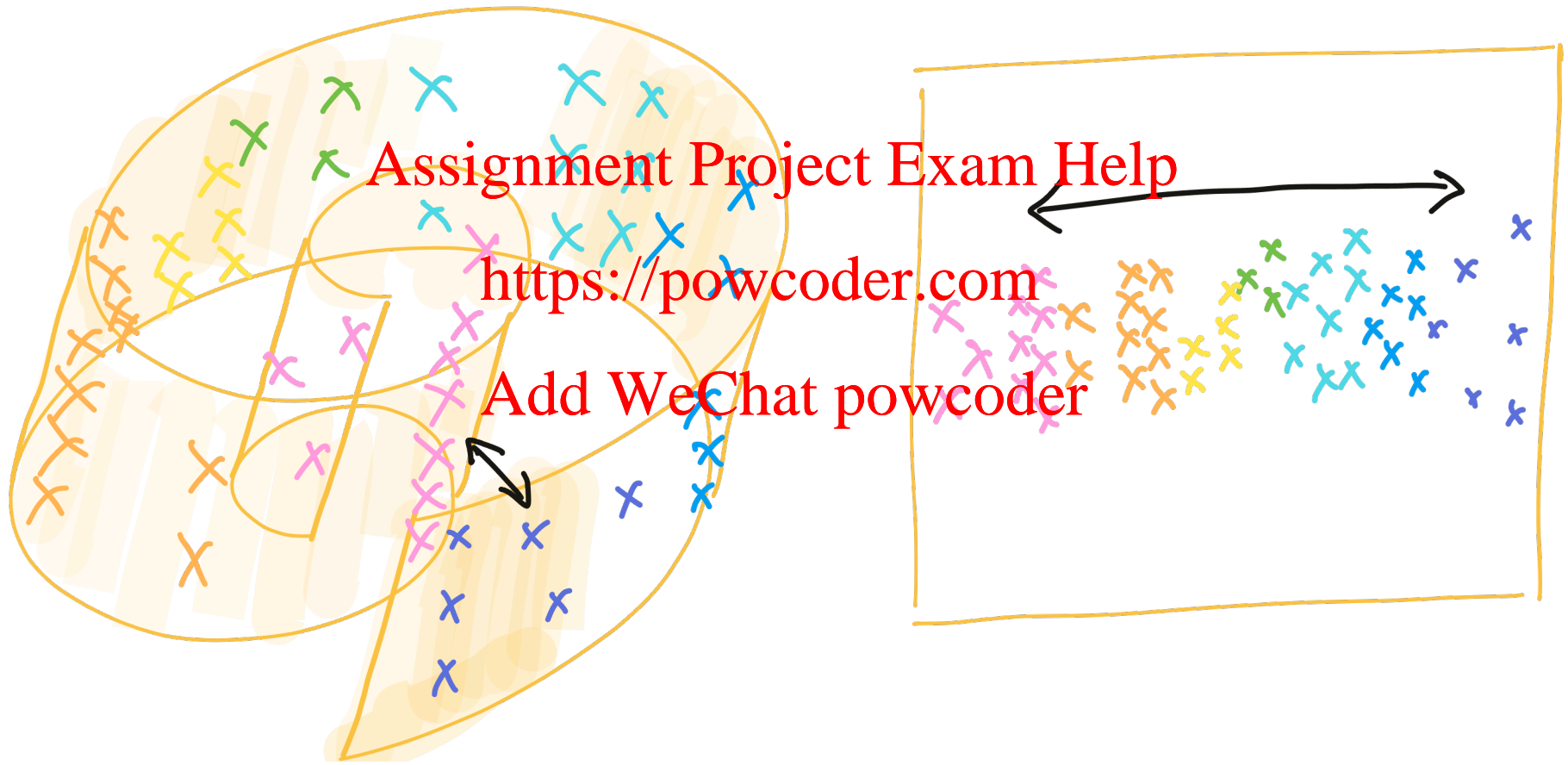
D. DECOMPOSITION

KERNEL METHODS



D. DECOMPOSITION

MANIFOLD LEARNING



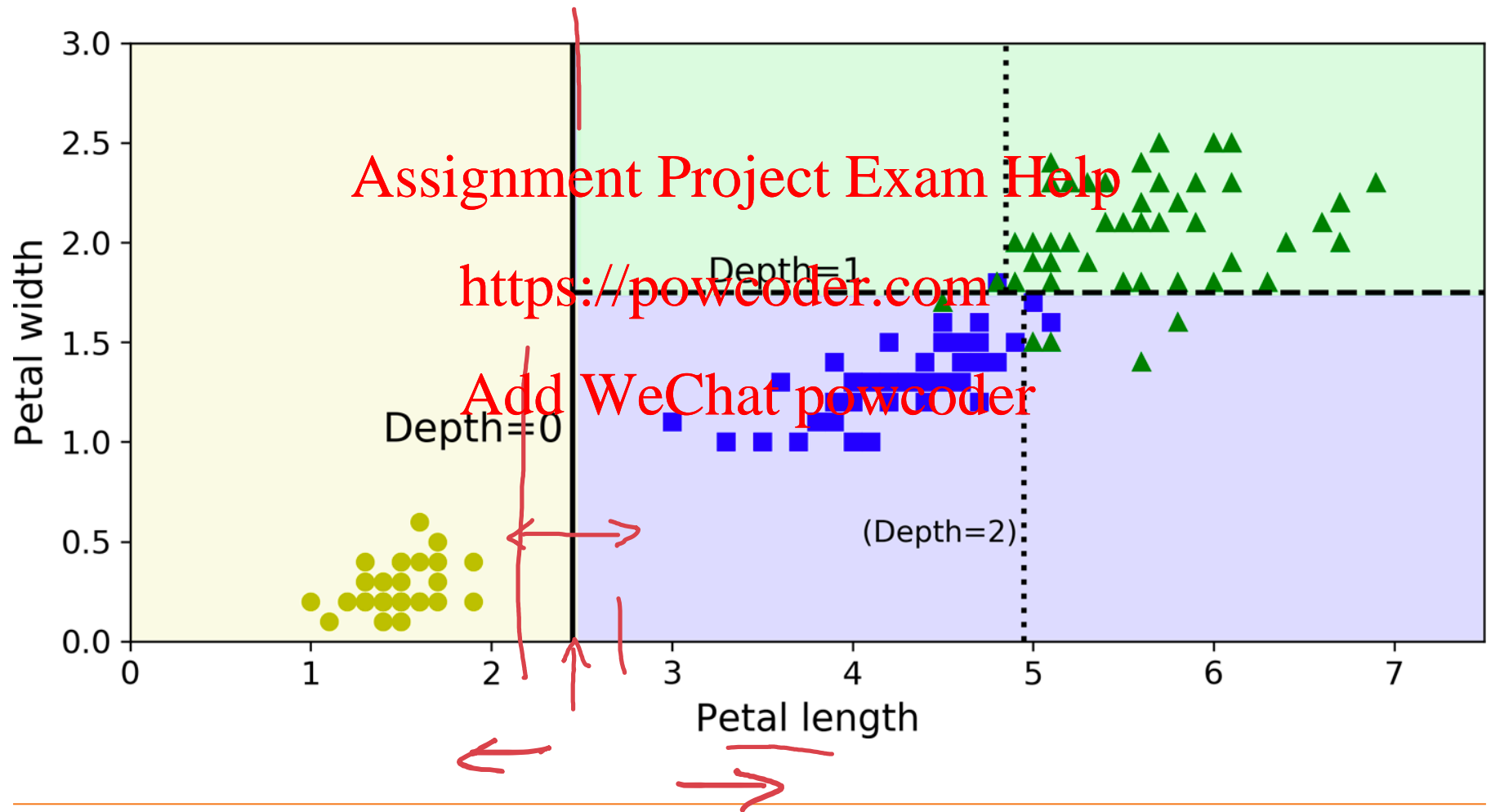
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Support Vector Machines

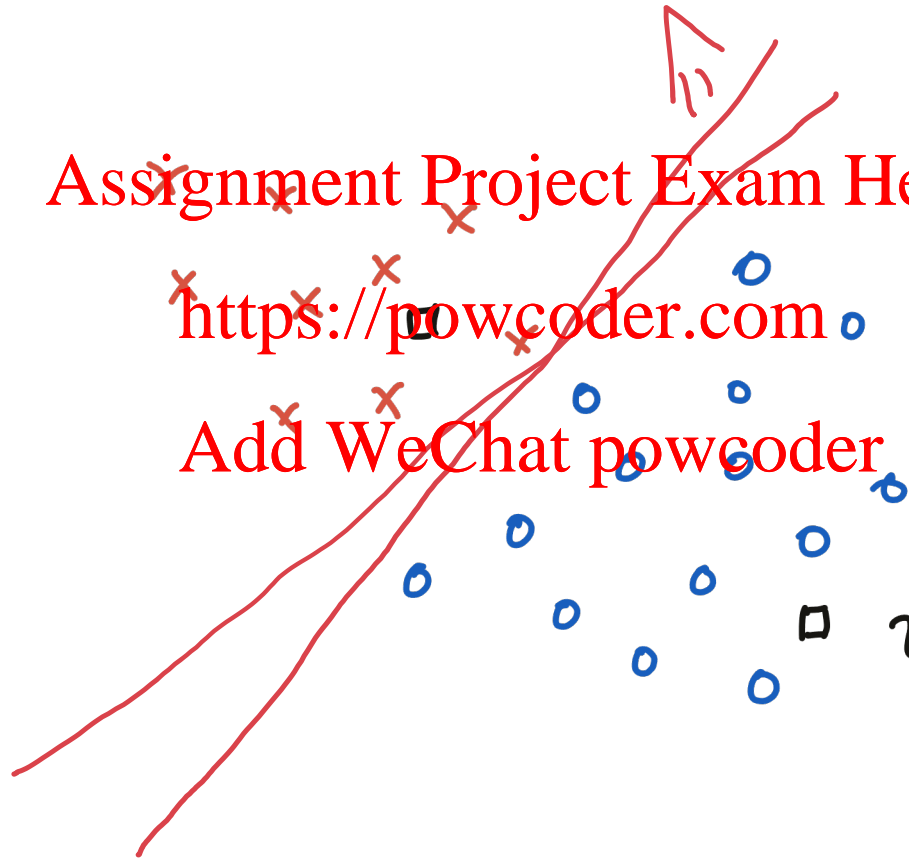
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DECISION BOUNDARIES



A. CLASSIFICATION

CATEGORICAL VARIABLE



Model requirements

Classification

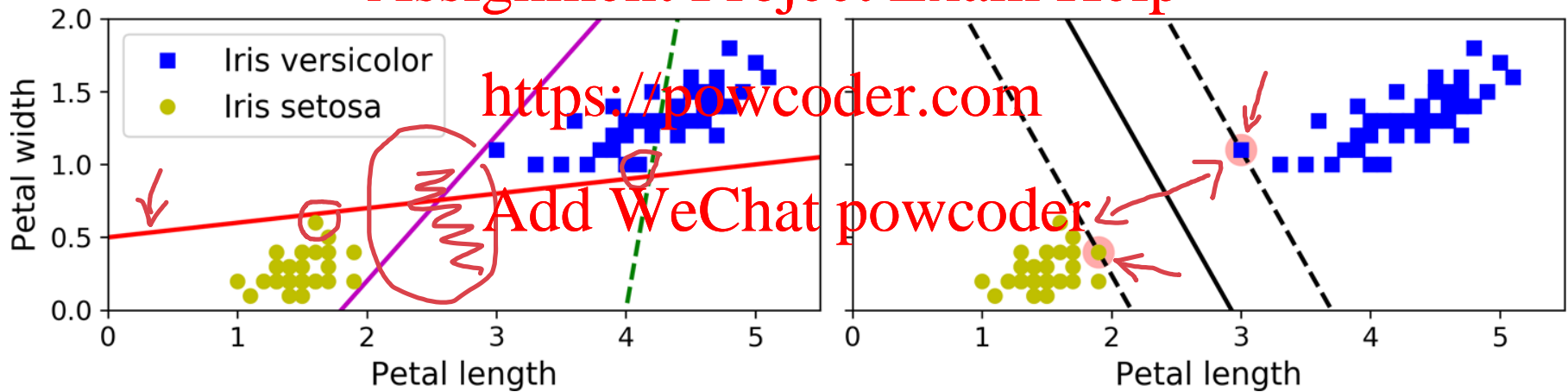
$$x \in [-\infty, \infty]$$

$$y \in \{0, N\}$$

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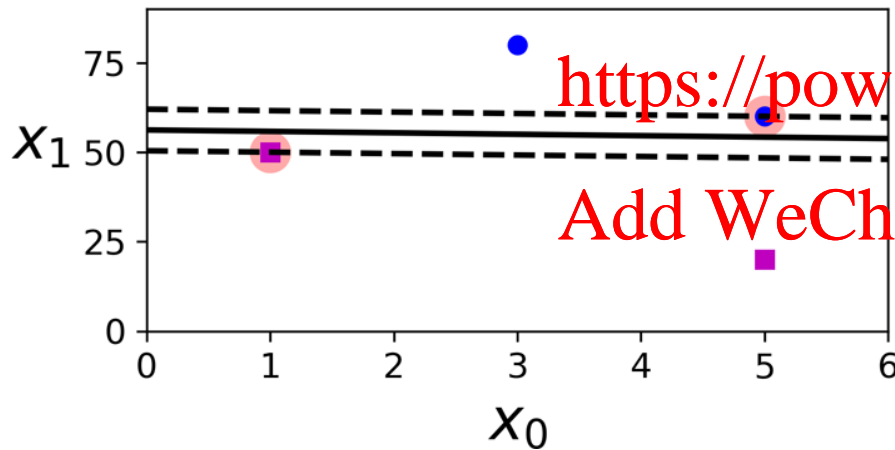
FEATURE SCALING

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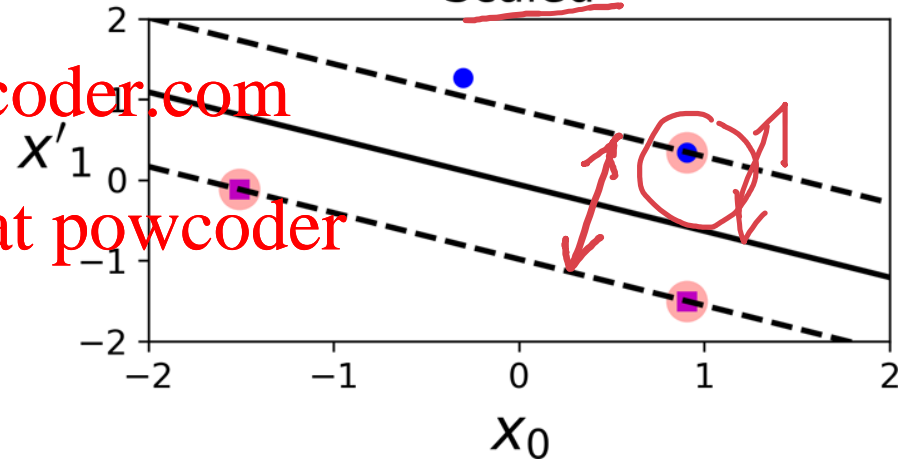
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Unscaled



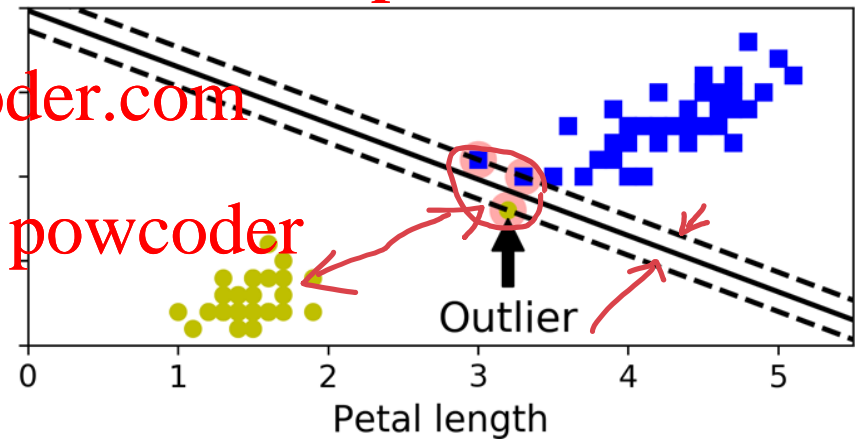
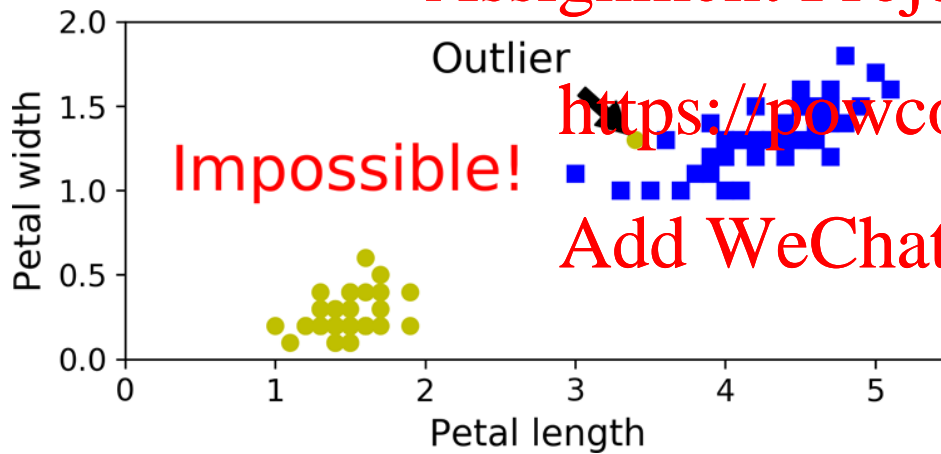
Scaled



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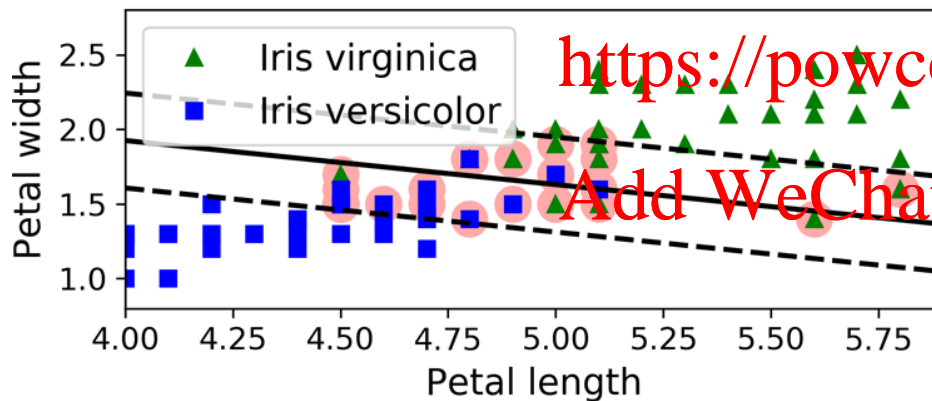
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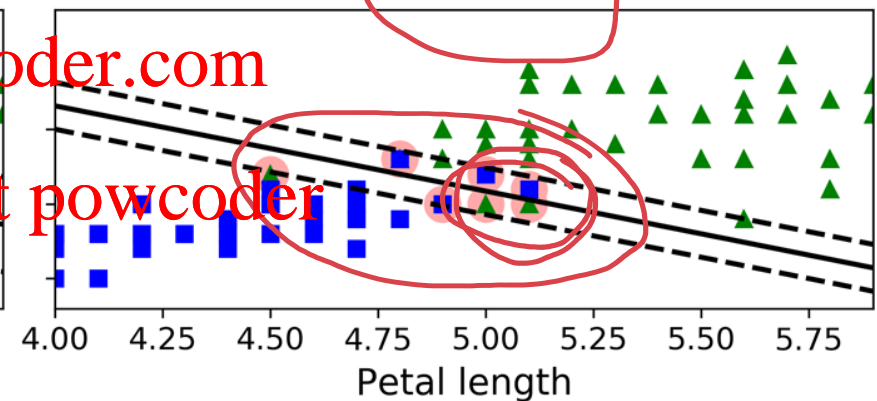
MARGIN VIOLATIONS

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$C = 1$



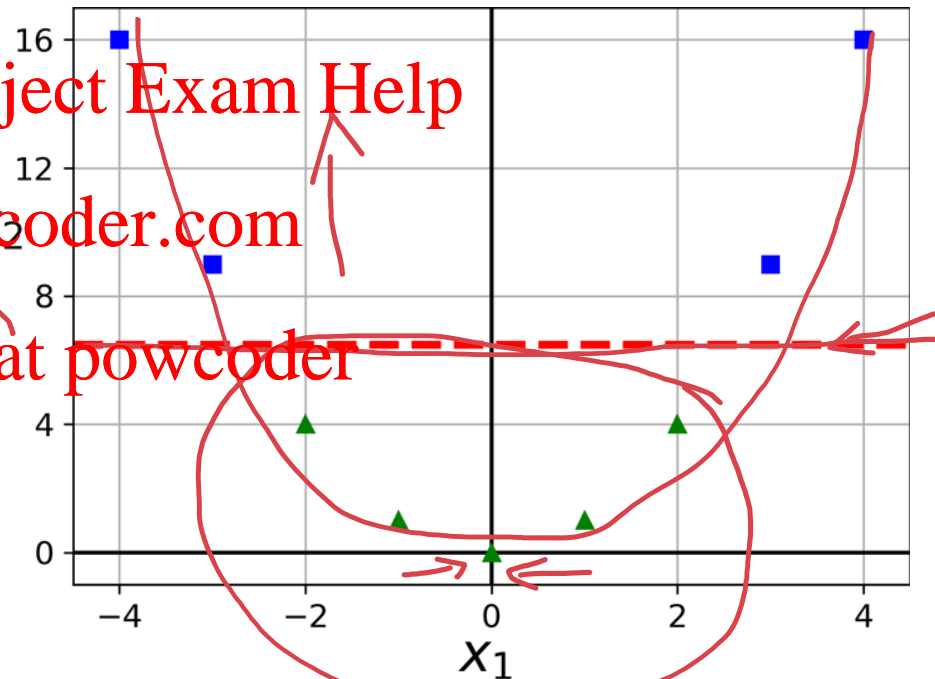
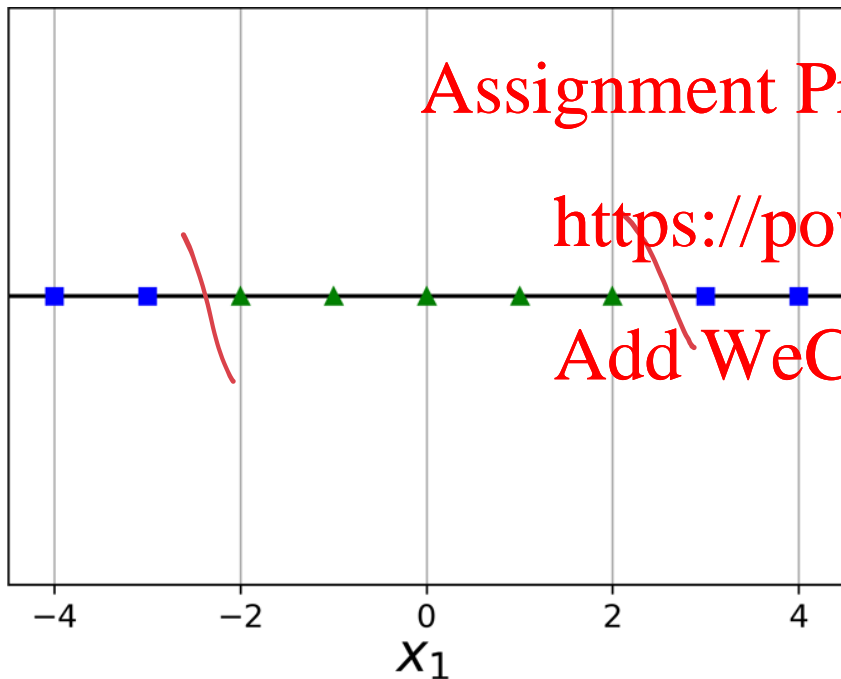
$C = 100$



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HIGHER DIMENSIONS (FEATURES)

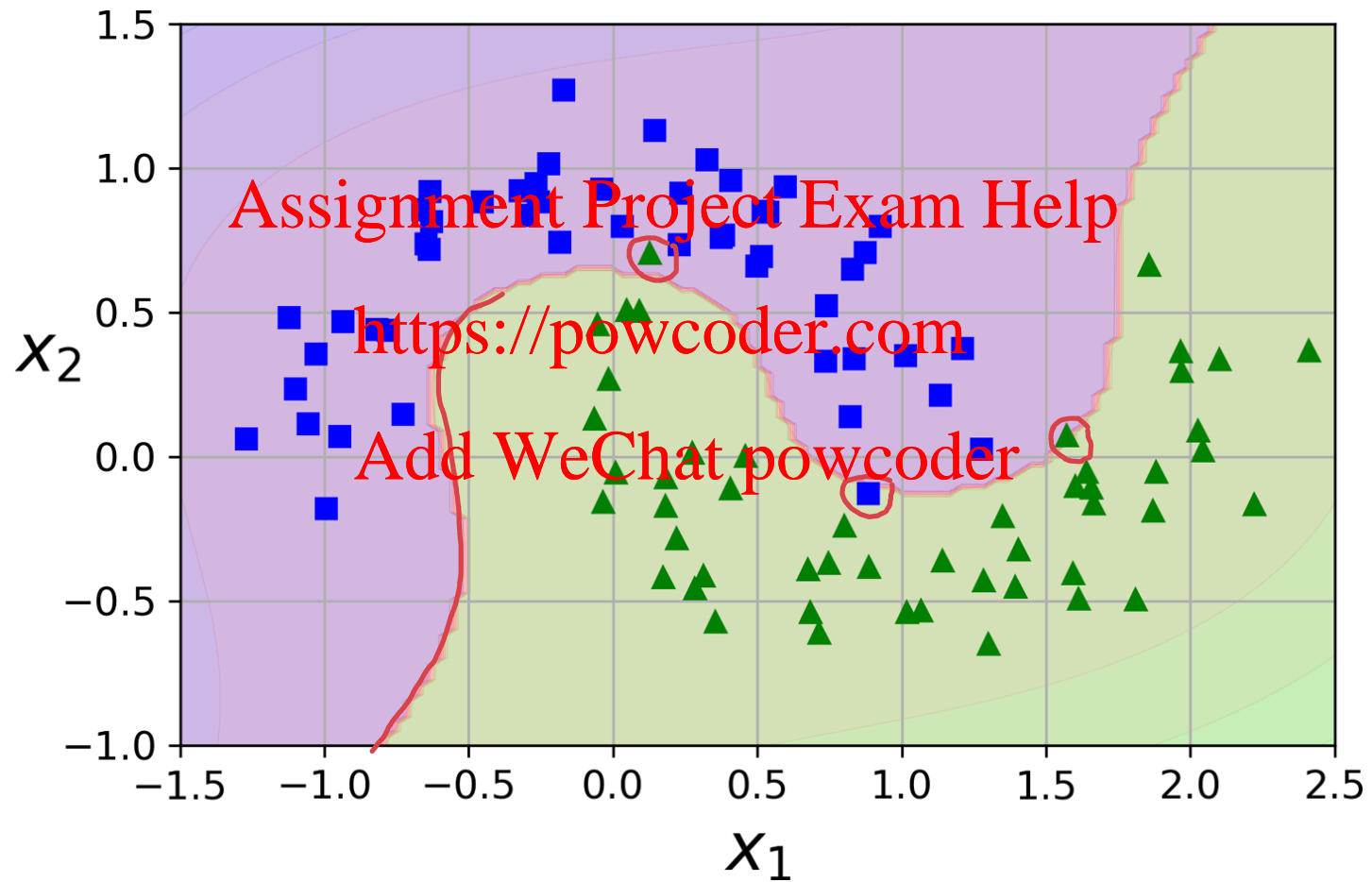


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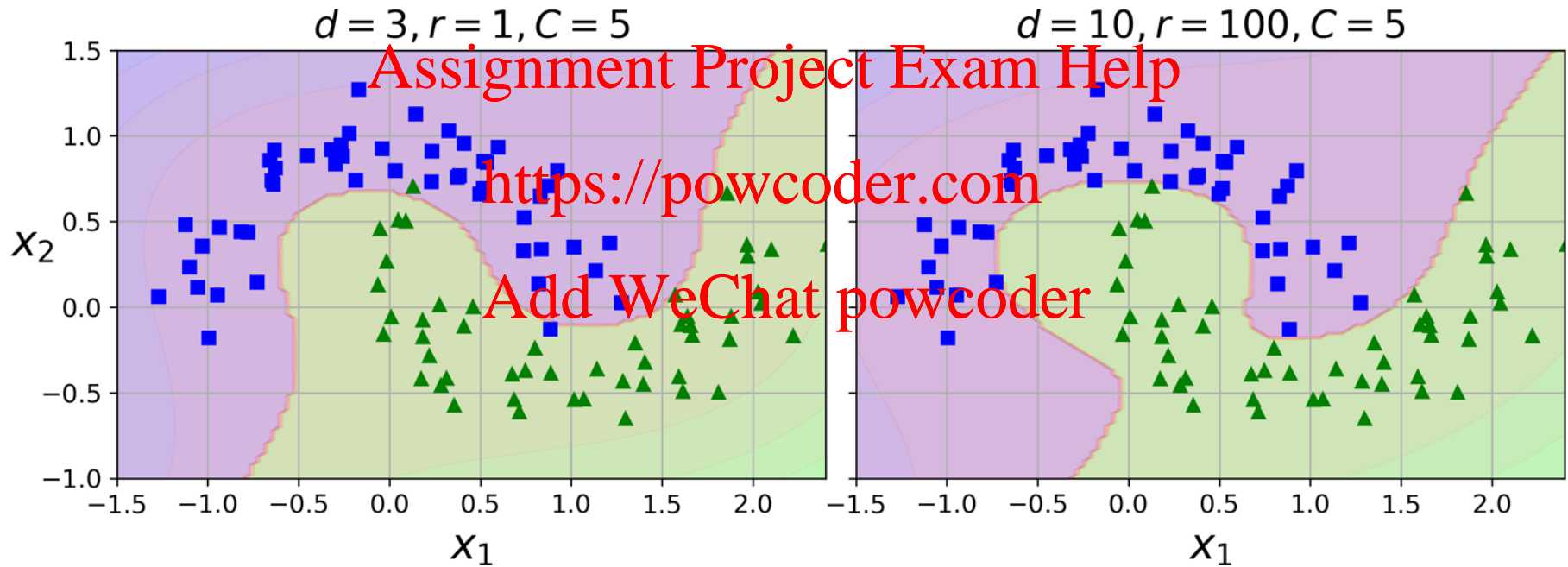
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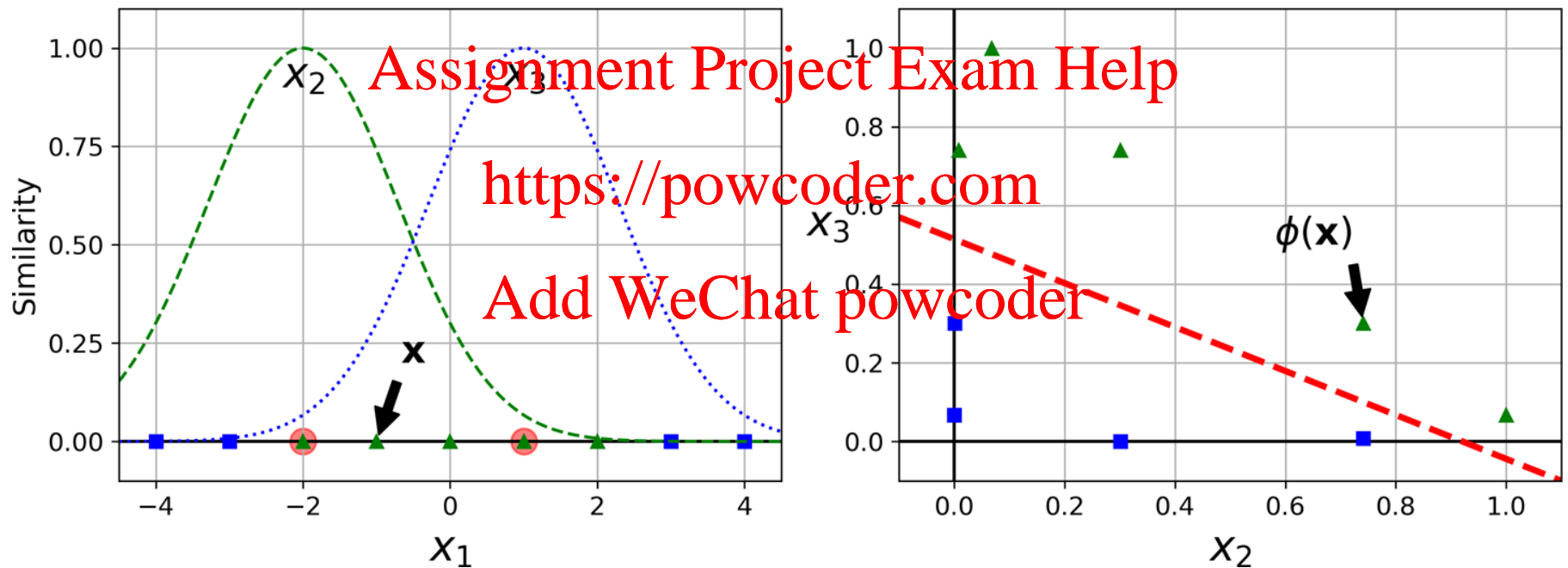
LINEAR SVM



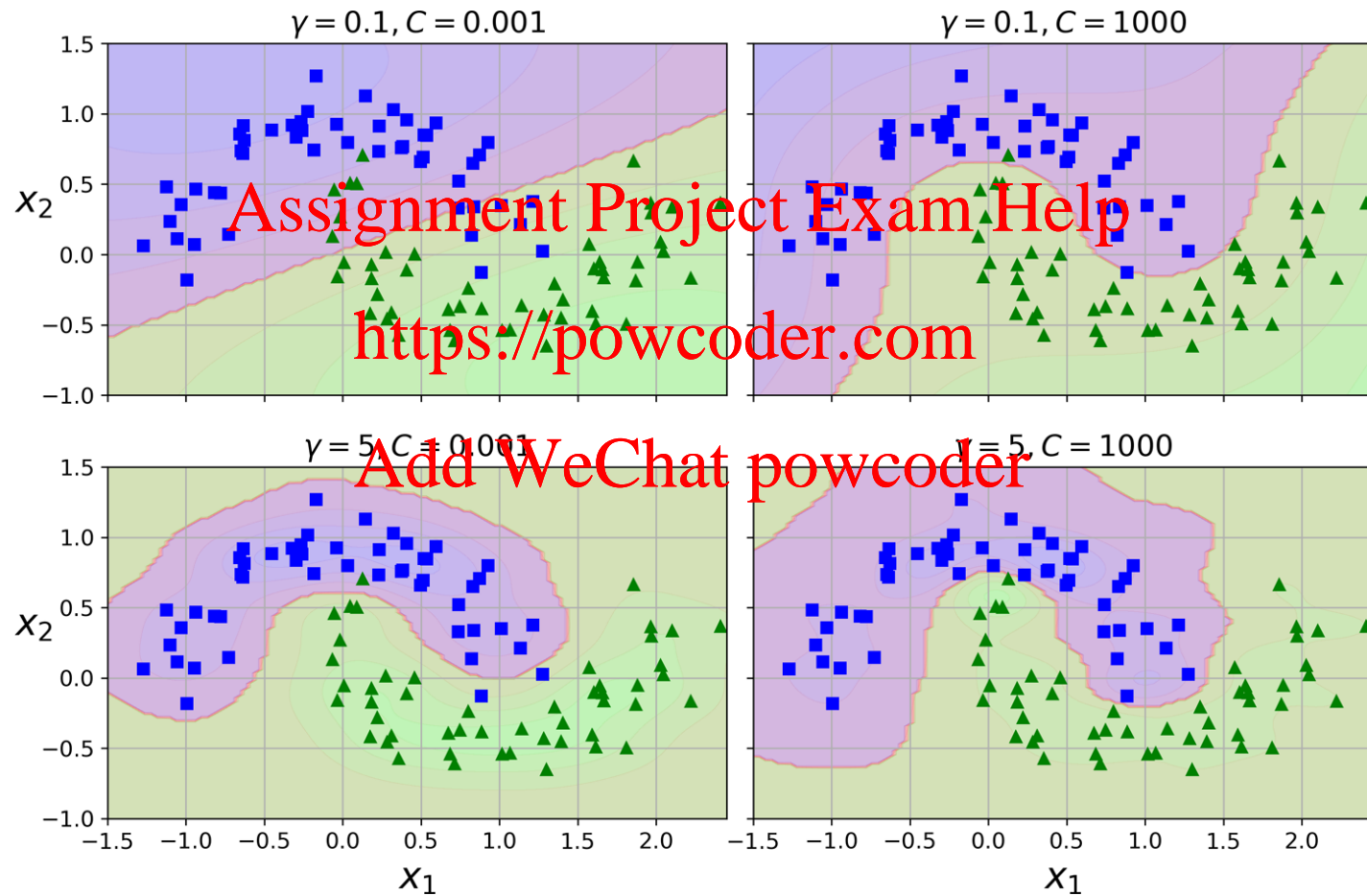
POLYNOMIAL KERNEL



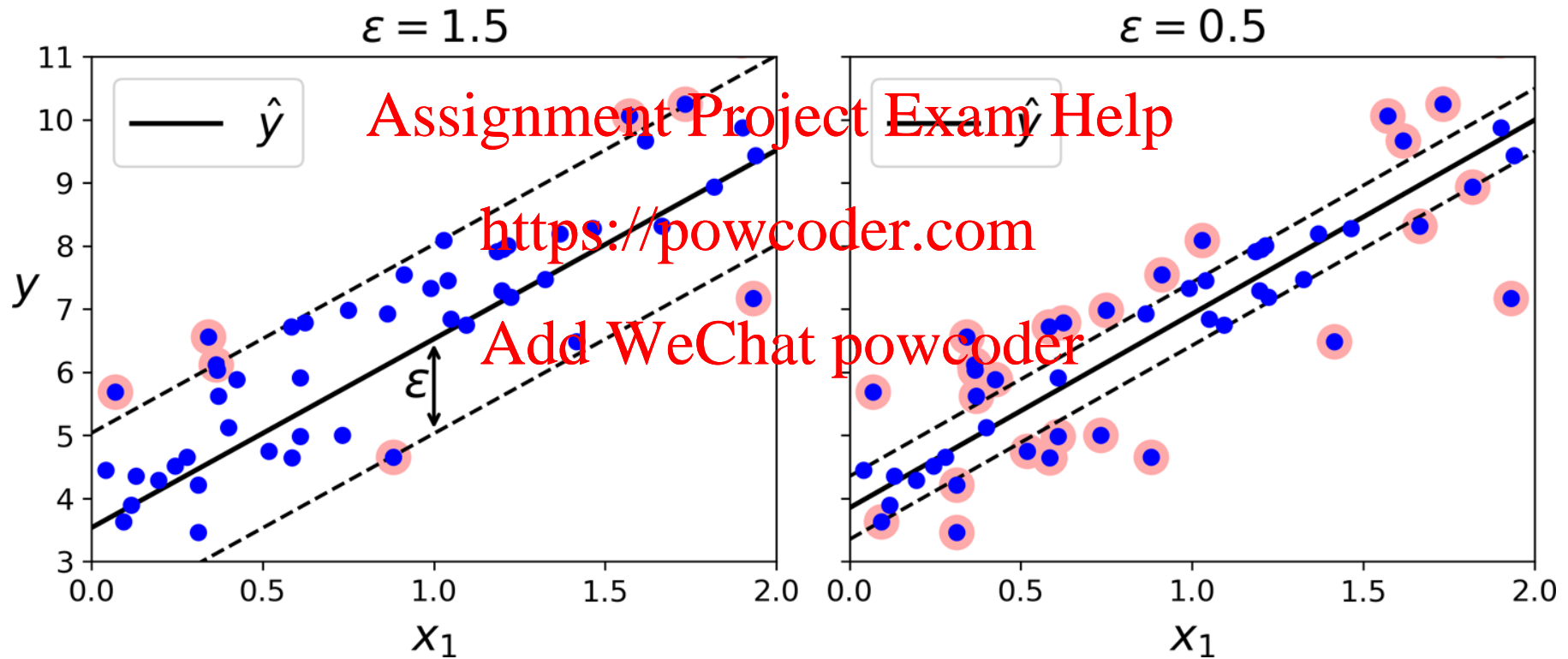
SIMILARITY FEATURES



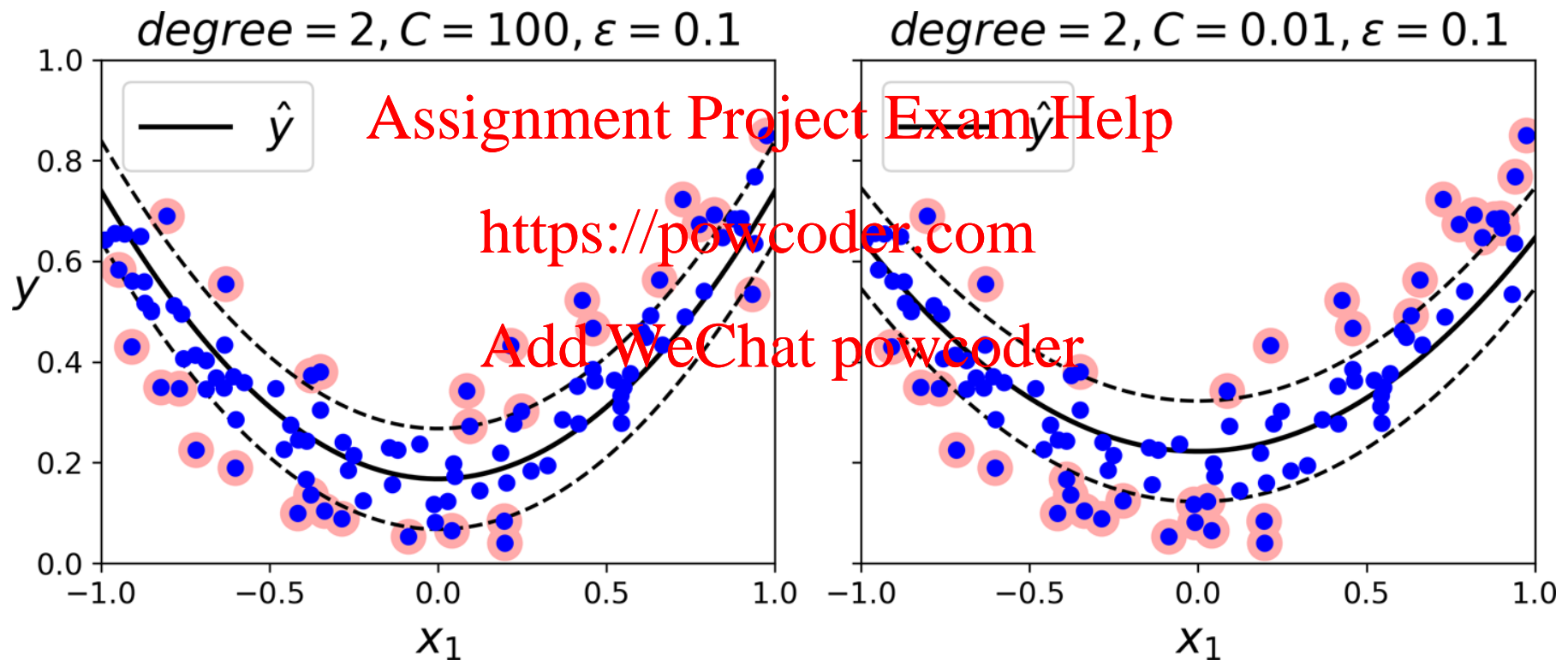
RBF KERNEL



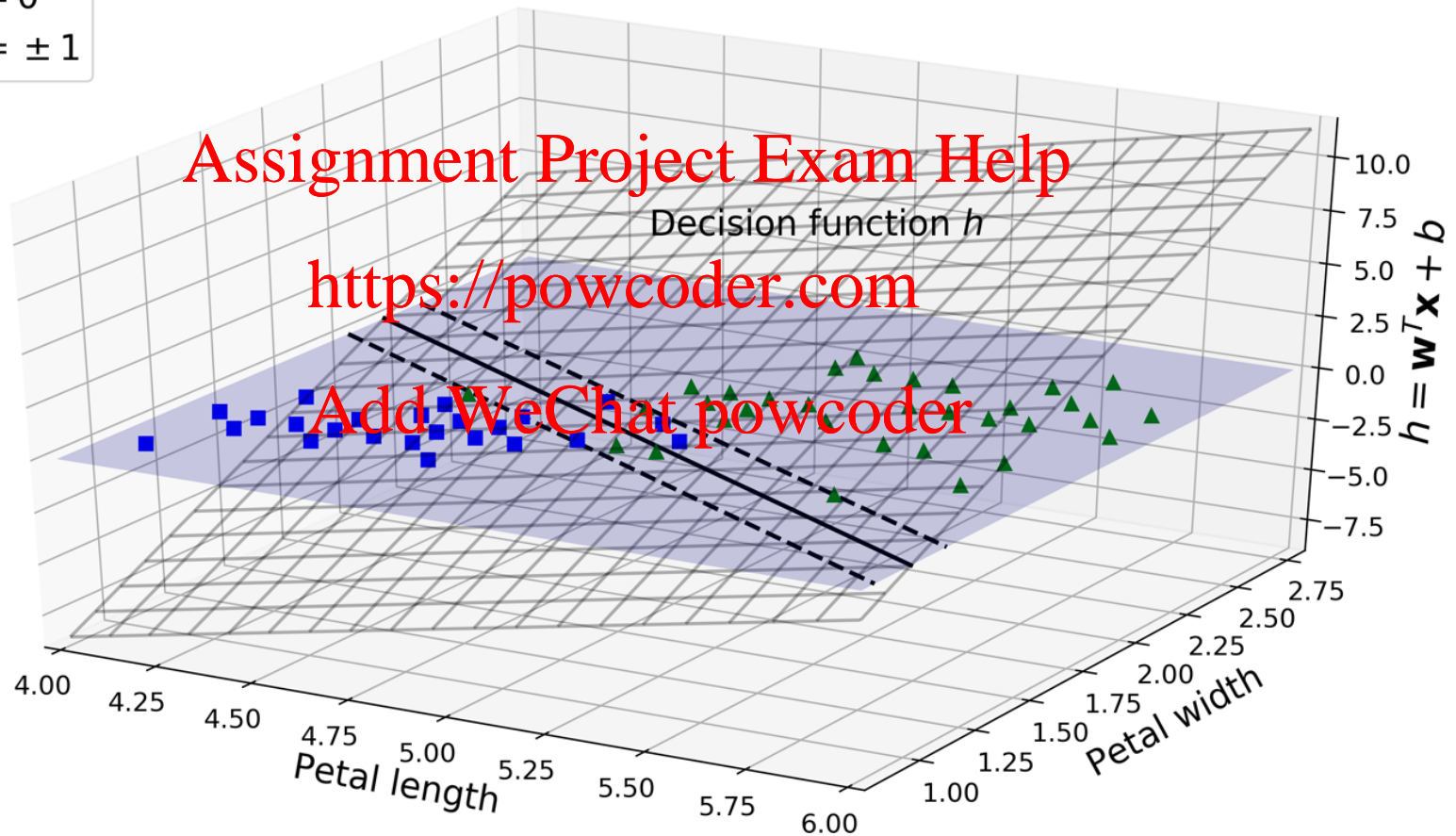
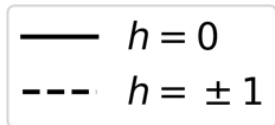
SVM REGRESSION



SVM POLYNOMIAL REGRESSION



DECISION FUNCTION



— **Kernel Trick**

— Optimization

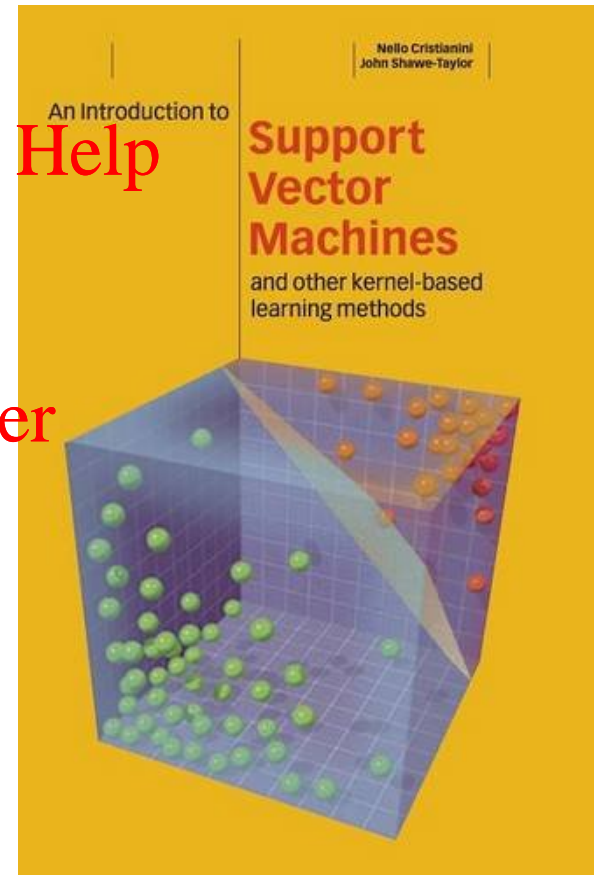
— Quadratic programming

— The Dual problem

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