PSY9511: Seminar 5

Beyond linearity: Extensions of linear models and tree-based models

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Outline

1. Exercise 3
2. Exercise 4
3. Recap
4. Extensions of linear models
   - 4.1 Generalized linear models (GLMs)
   - 4.2 Generalized additive models (GAMs)
5. Tree-based models
   - 5.1 Decision trees
   - 5.2 Random forests
   - 5.3 Gradient boosting (XGBoost)
6. Neural networks (Lecture 7/8)

Tree-based models

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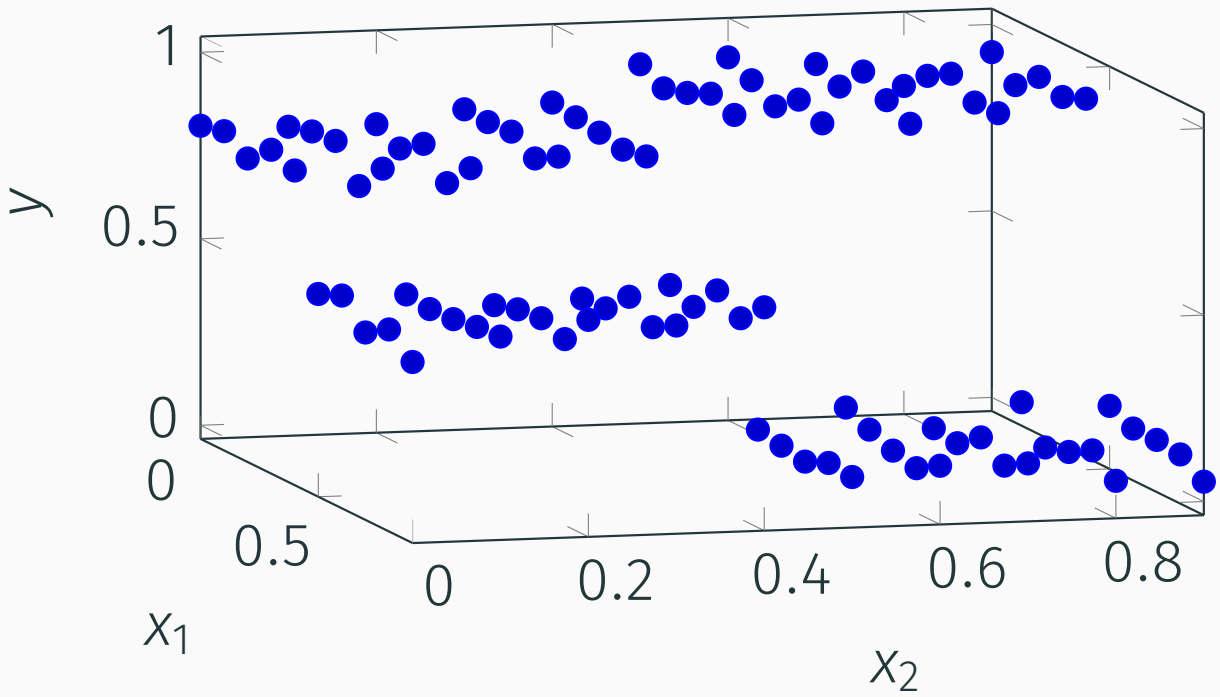
Tree-based models: Motivation



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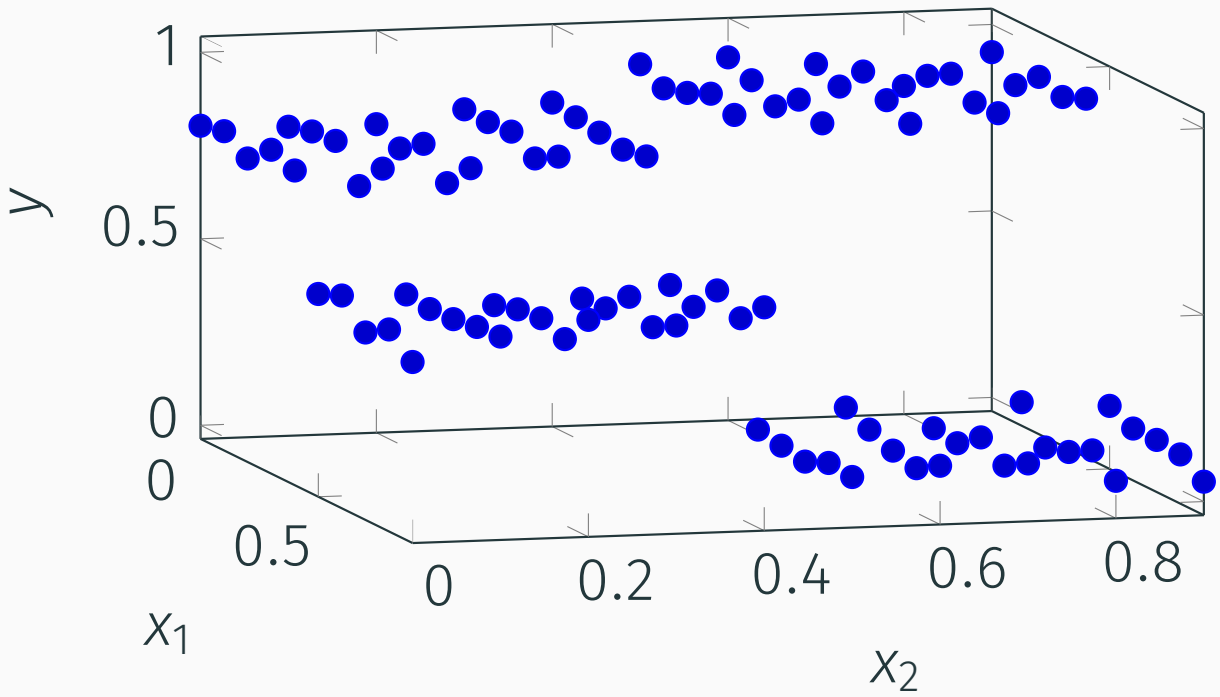
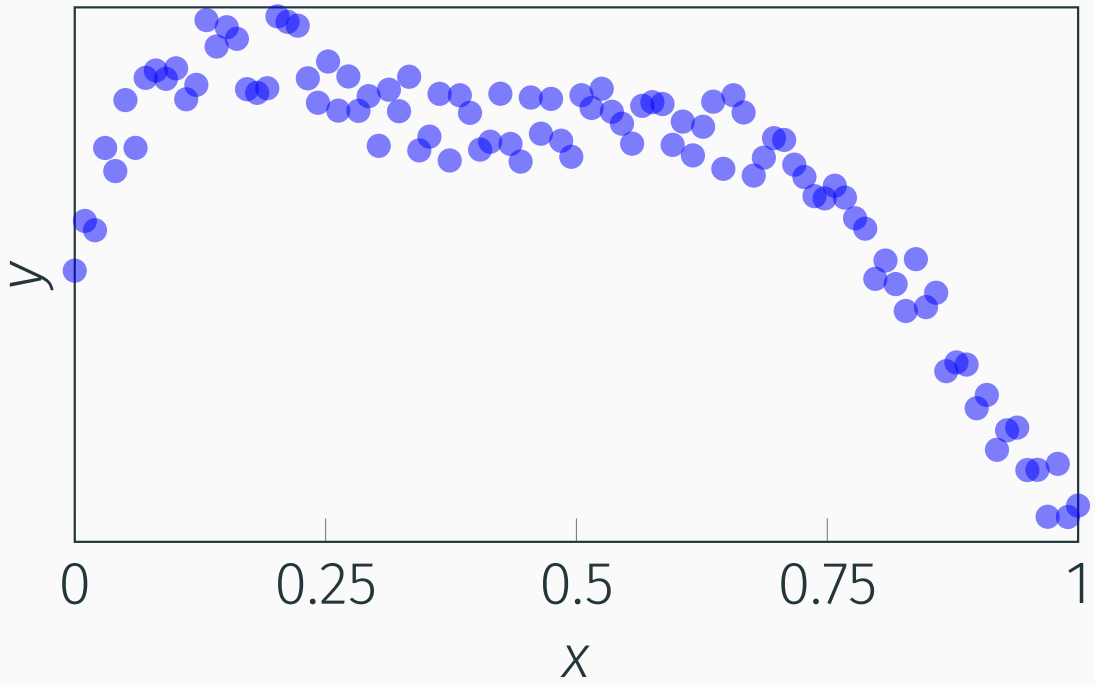


$$y = \begin{cases} 0.8 & x_1 \leq 0.5 \;\&\; x_2 \leq 0.5 \\ 0.9 & x_1 \leq 0.5 \;\&\; x_2 > 0.5 \\ 0.5 & x_1 > 0.5 \;\&\; x_2 \leq 0.5 \\ 0.1 & x_1 > 0.5 \;\&\; x_2 > 0.5 \end{cases}$$

Tree-based models: Motivation



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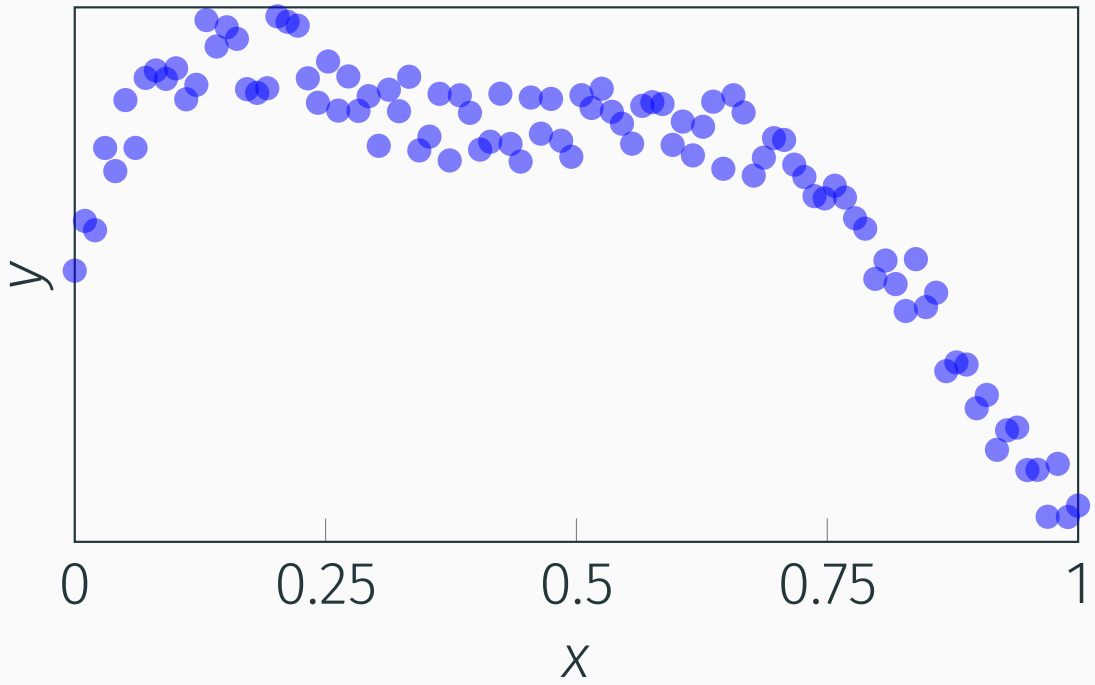
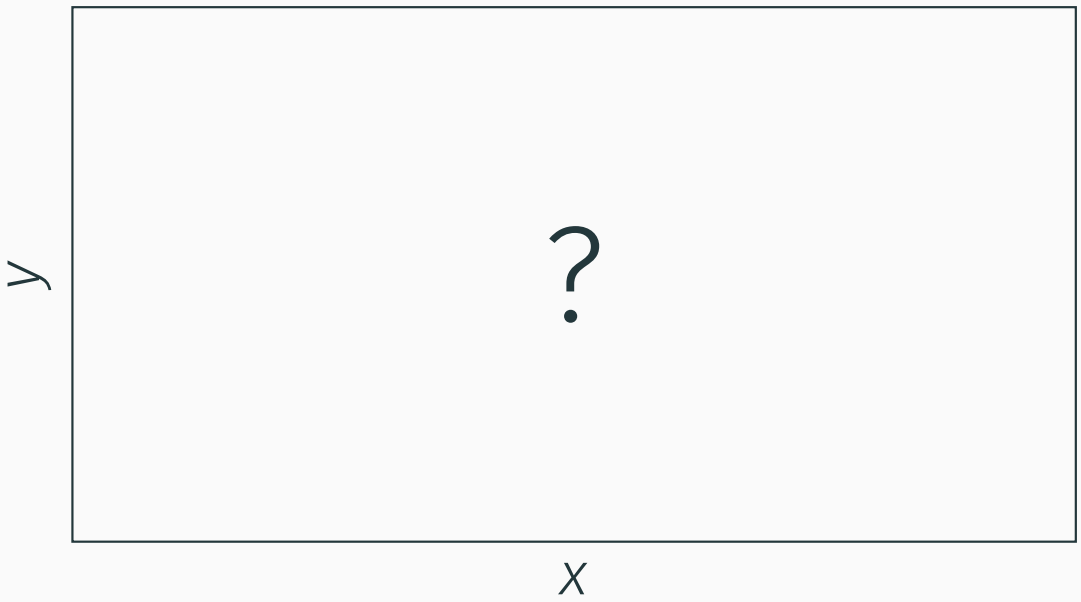


$$y = ?x^5 + ?x^4 + ?x^3 + ?x^2 + ?x + ?$$

Tree-based models: Motivation



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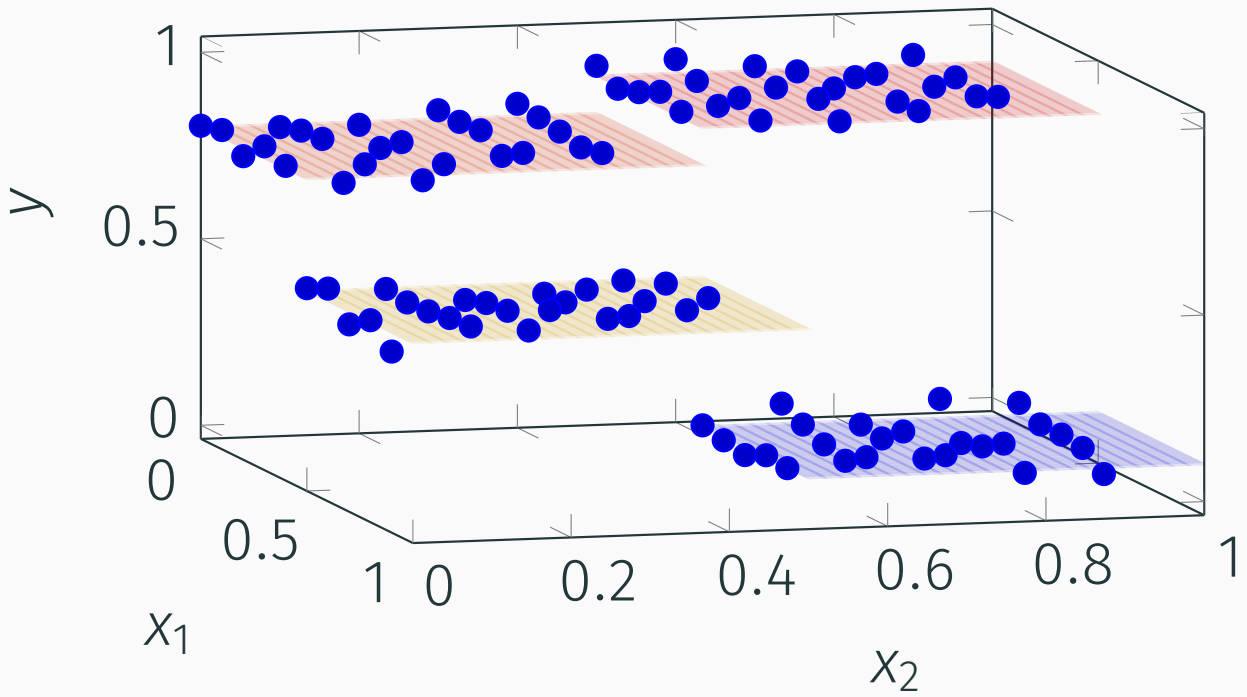

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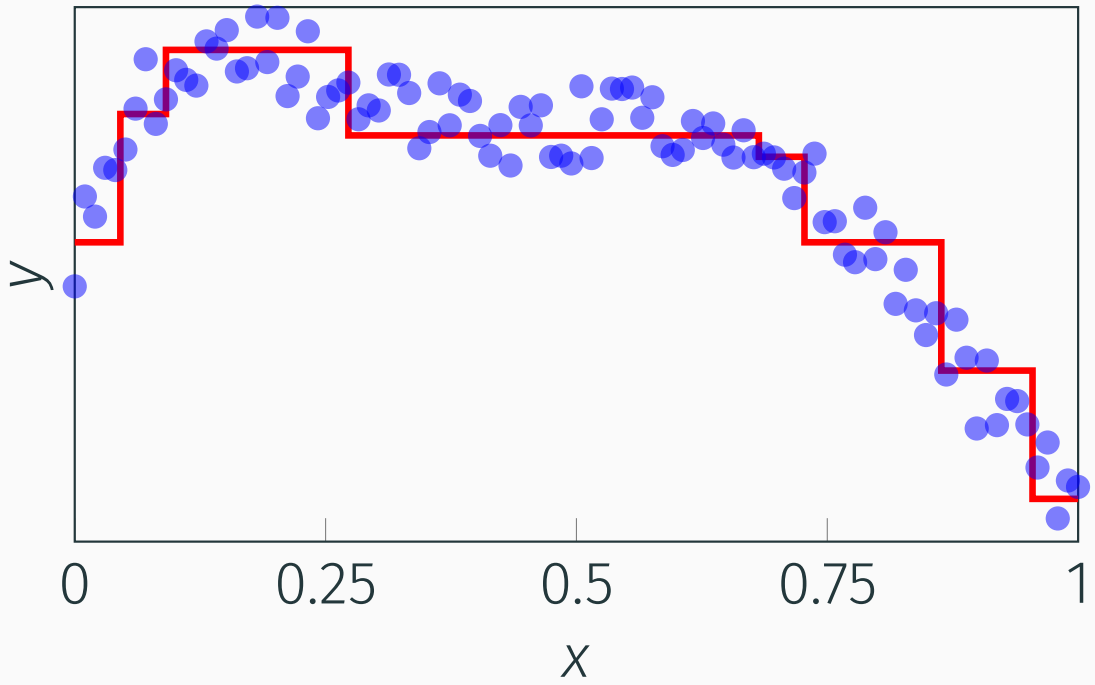

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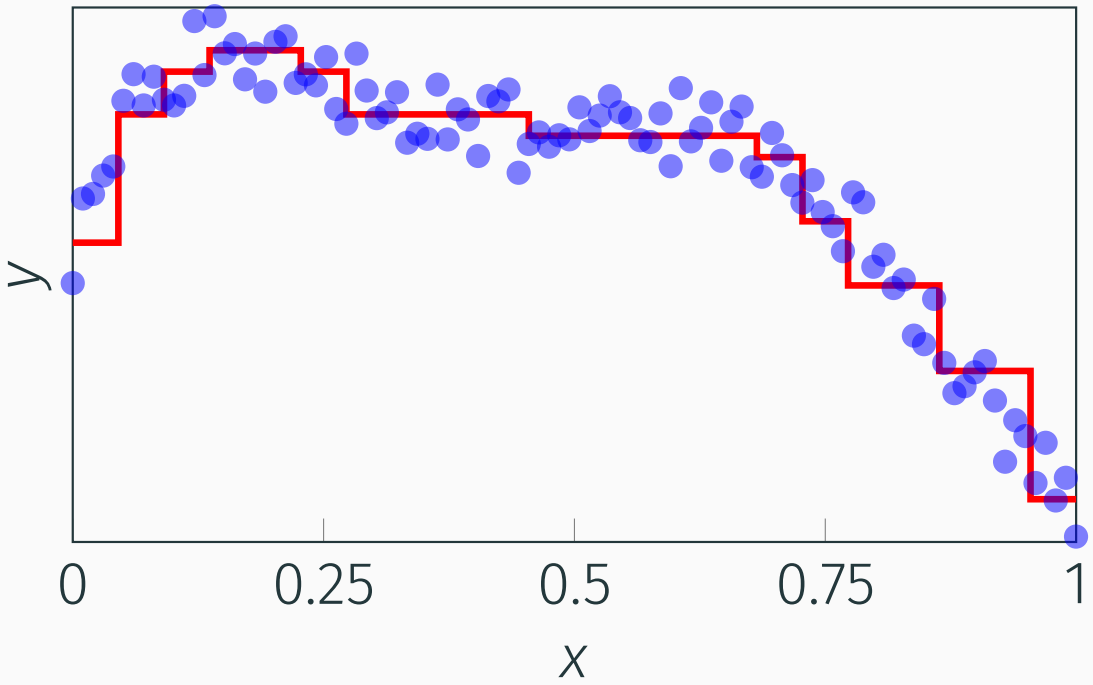

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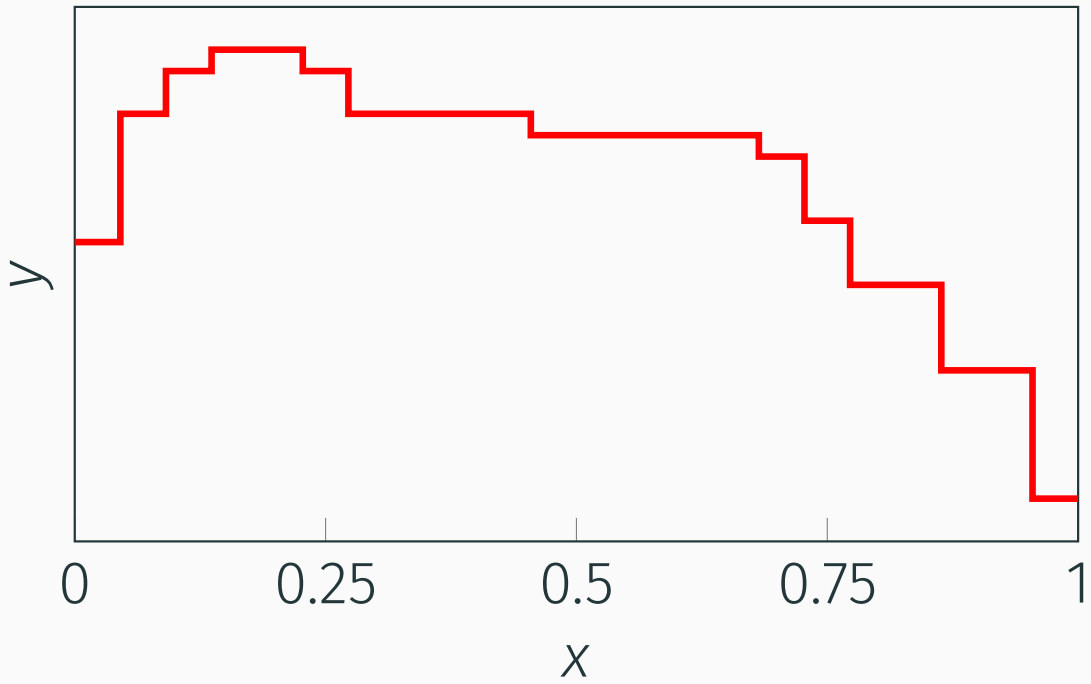

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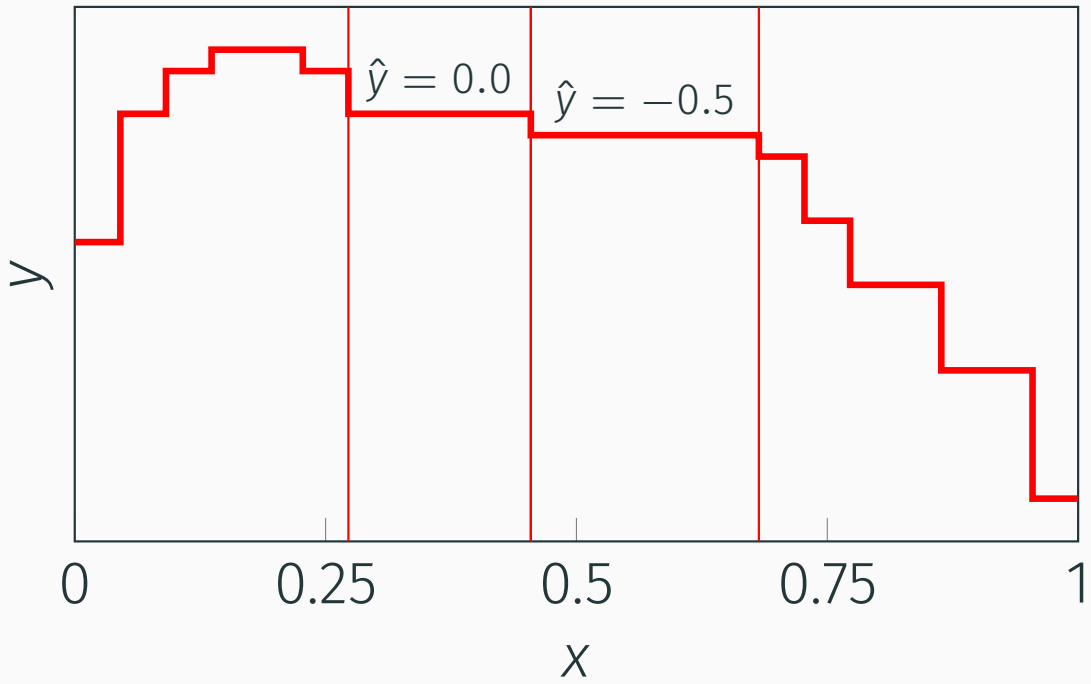

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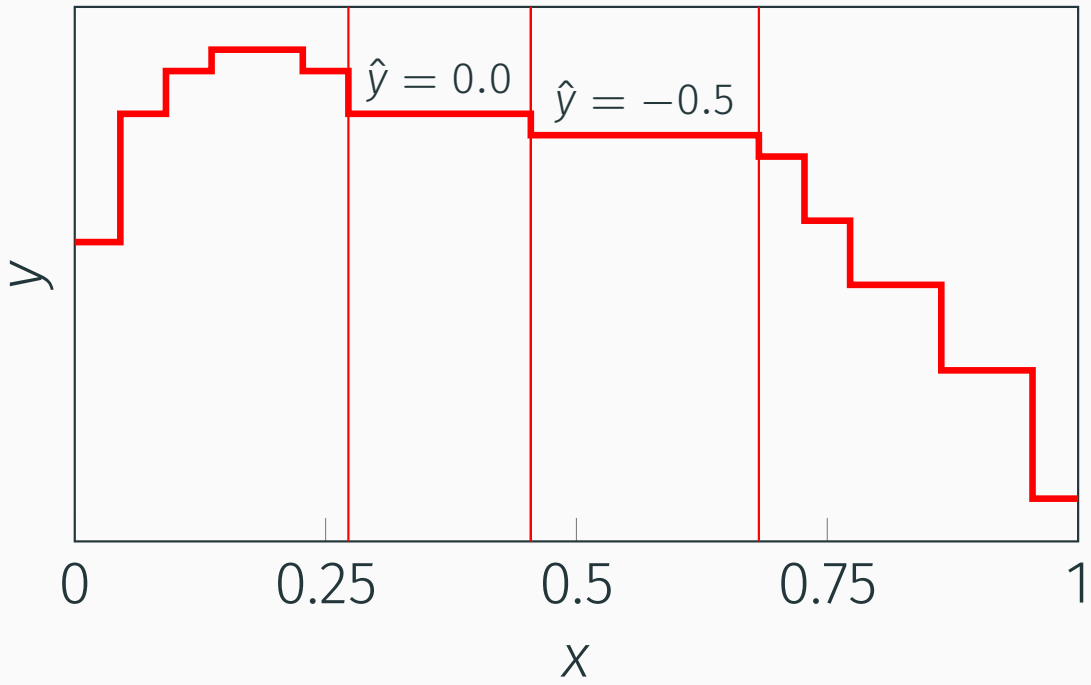
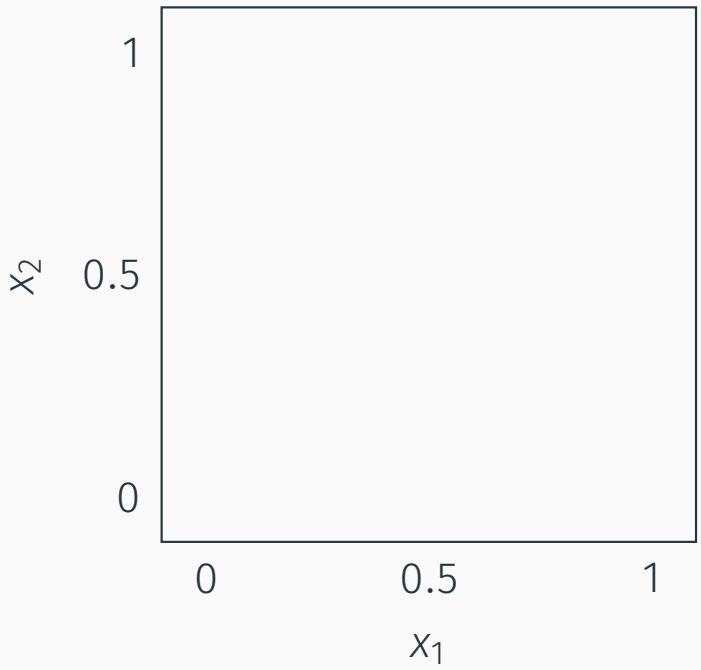


$$\hat{y} = \begin{cases} \dots & \\ 0.0 & x \geq 0.27 \ \& \ x < 0.45 \\ -0.5 & x \geq 0.45 \ \& \ x < 0.69 \\ \dots & \end{cases}$$

Tree-based models: Decision trees