PSY9511: Seminar 4

The basics of regression and classification

Esten H. Leonardsen

29.05.2024

UNIVERSITETET
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Recap

What is statistical learning?

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Inferentiental view: Finding a function $\hat{f}(X)$ that describes the relationship between some input variables X and an output variable y.

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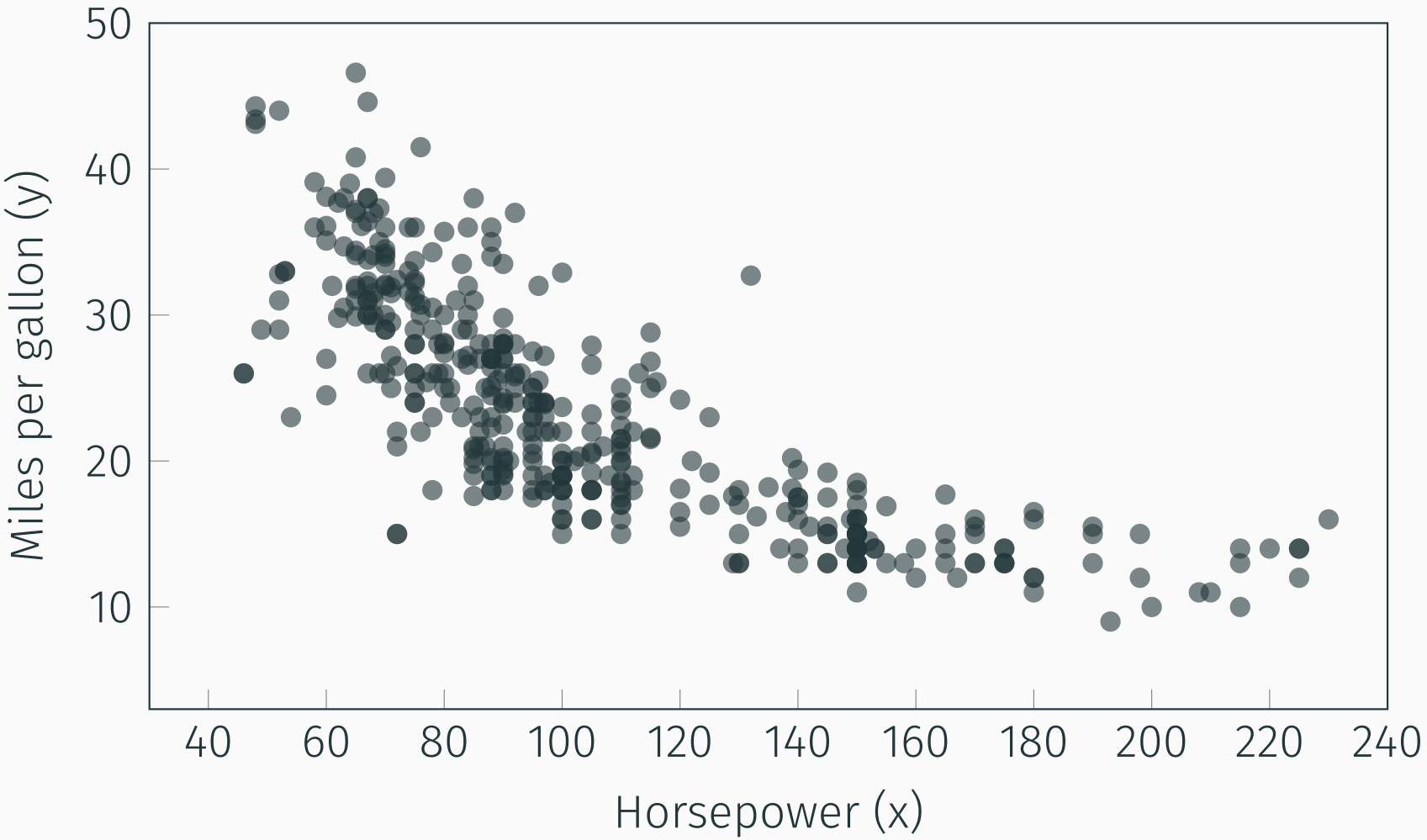
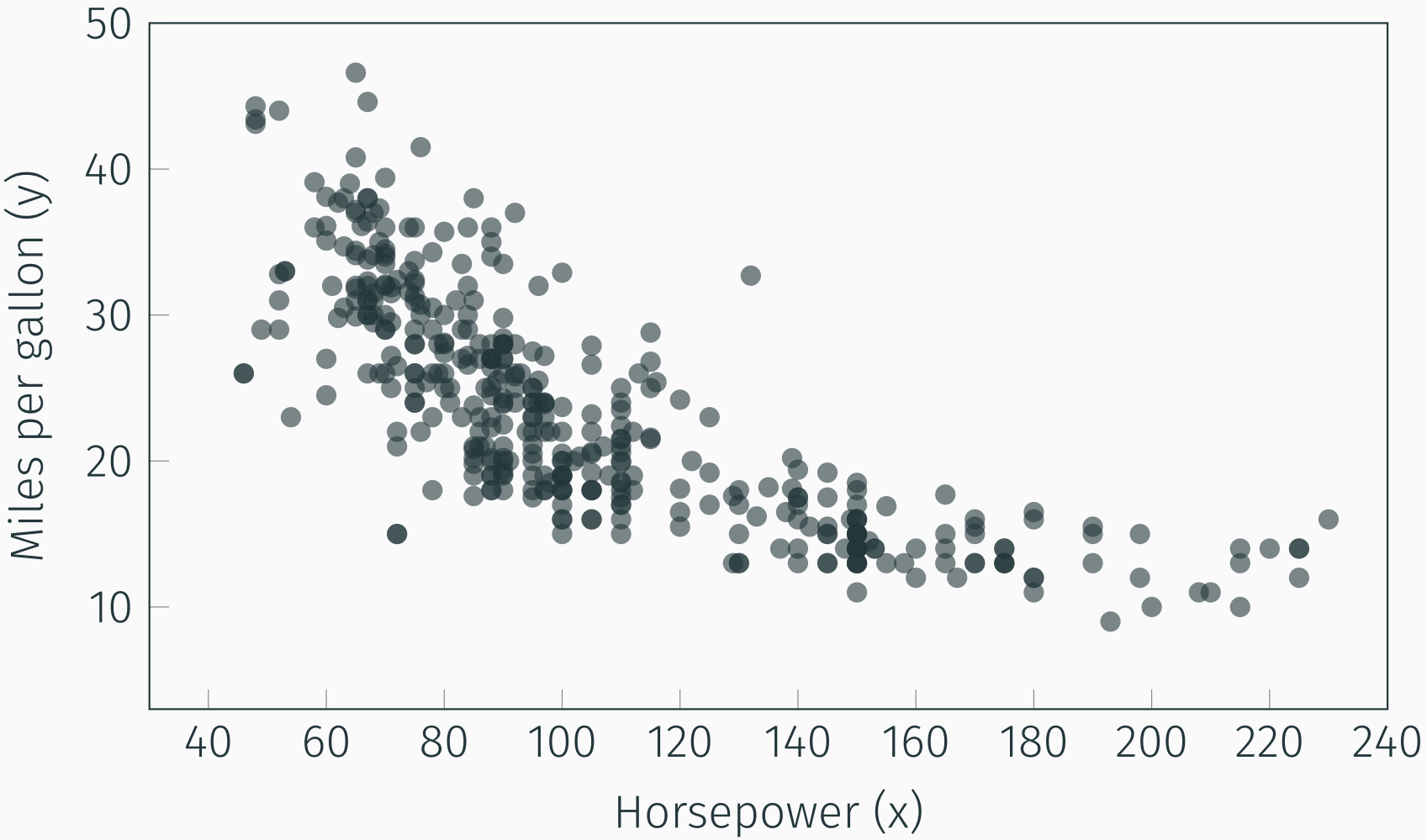
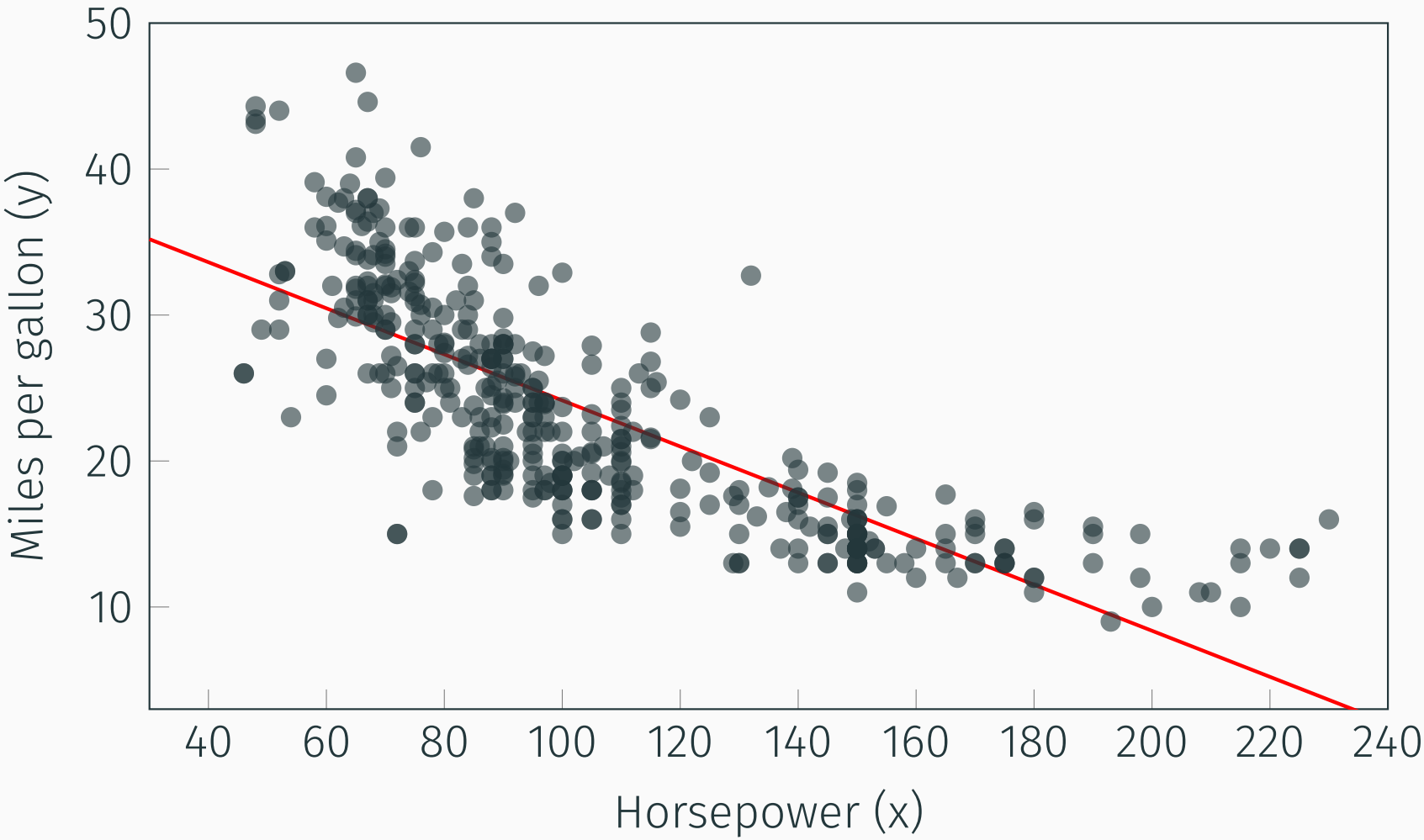

Miles per gallon (y)
50
40
30
20
10
40
60
80
100
120
140
160
180
200
220
240
Horsepower (x)

Recap



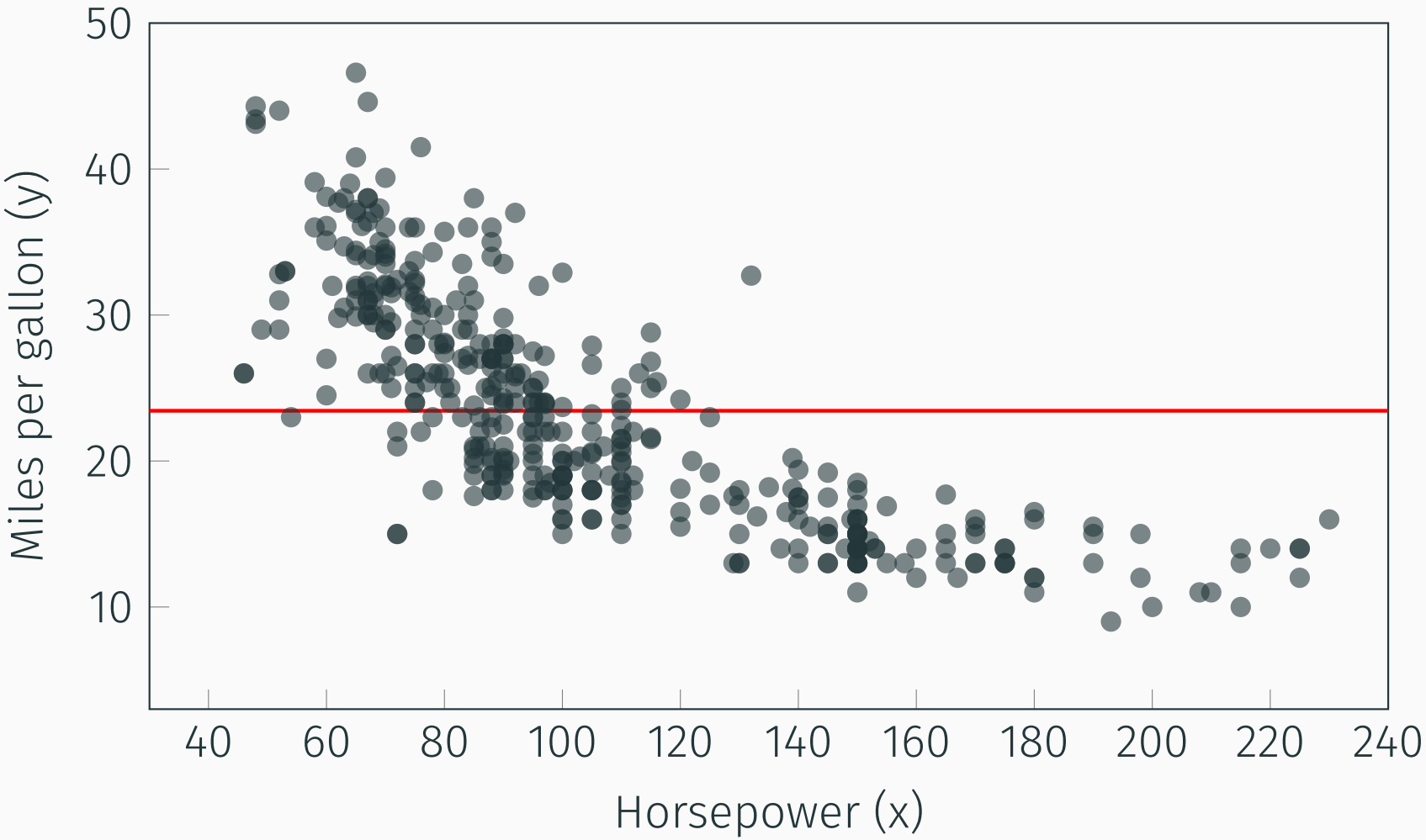
$$\hat{y} = \hat{f}(x)$$

Recap



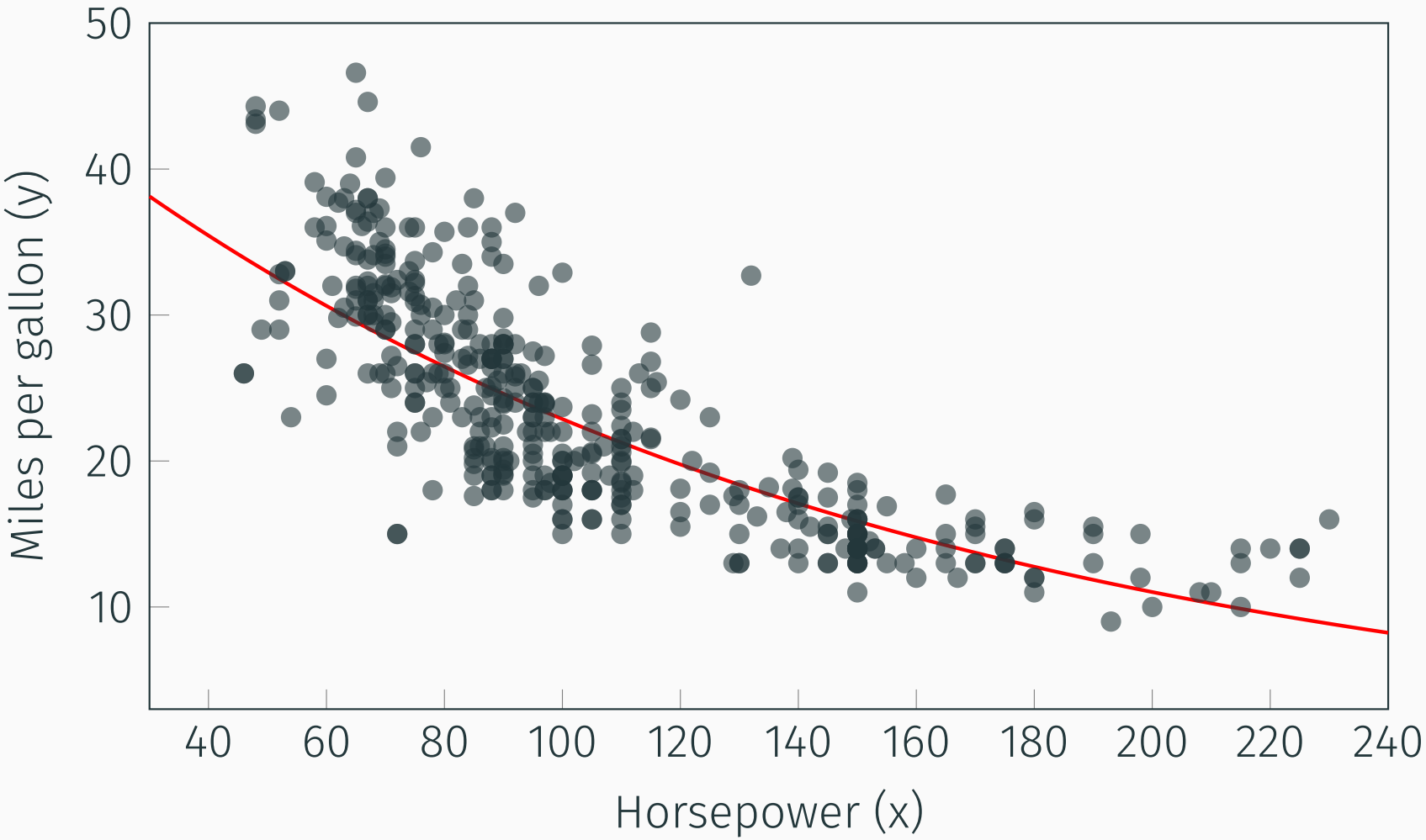
$$\hat{y} = 39.93 - 0.1578x$$

Recap



$$\hat{y} = 23.44$$

Recap



$$\hat{y} = e^{3.86 - 0.0073x}$$

Outline

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- Different types of outputs y: Regression vs classification

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  - Generative models

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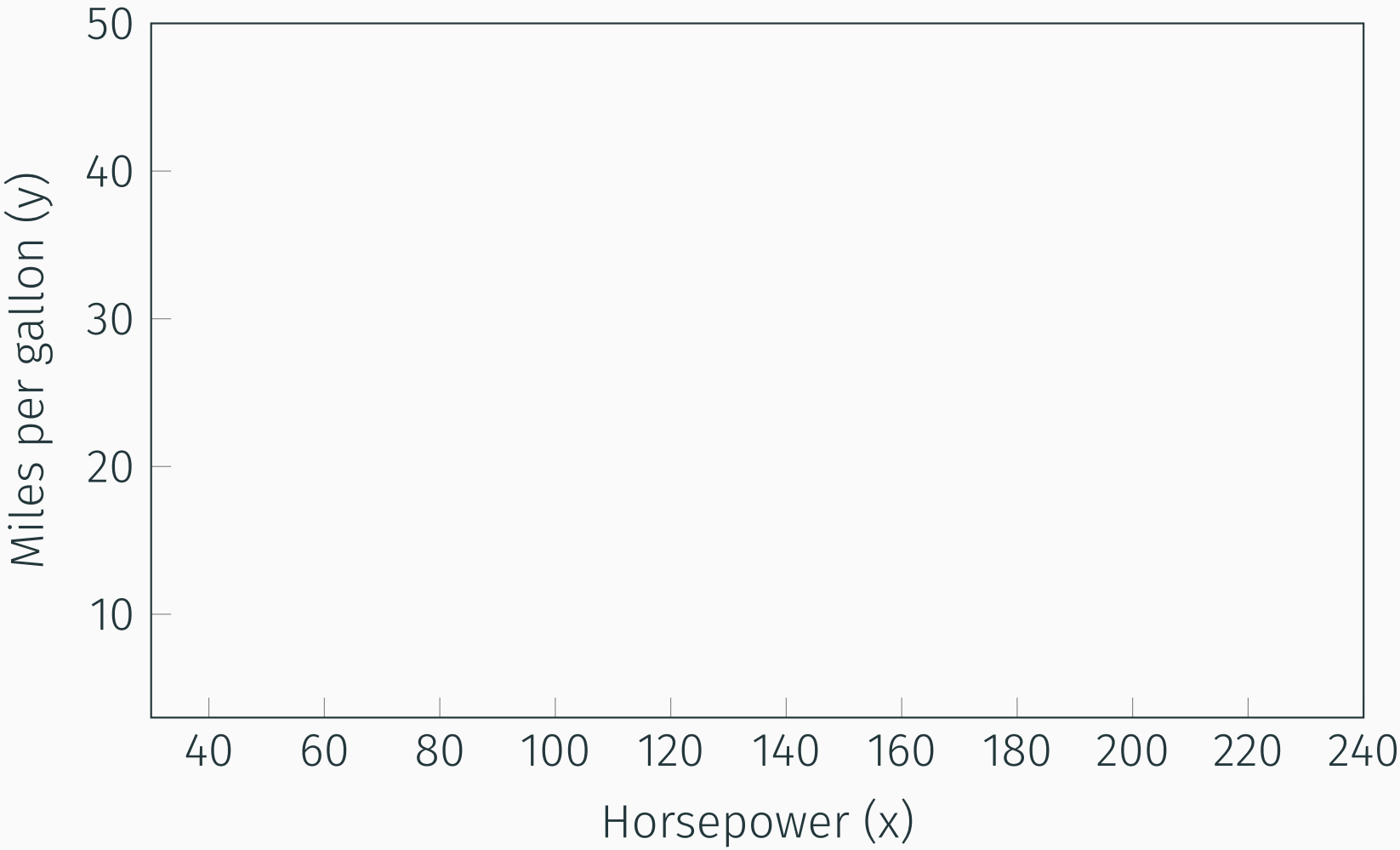
Plan for future lectures:

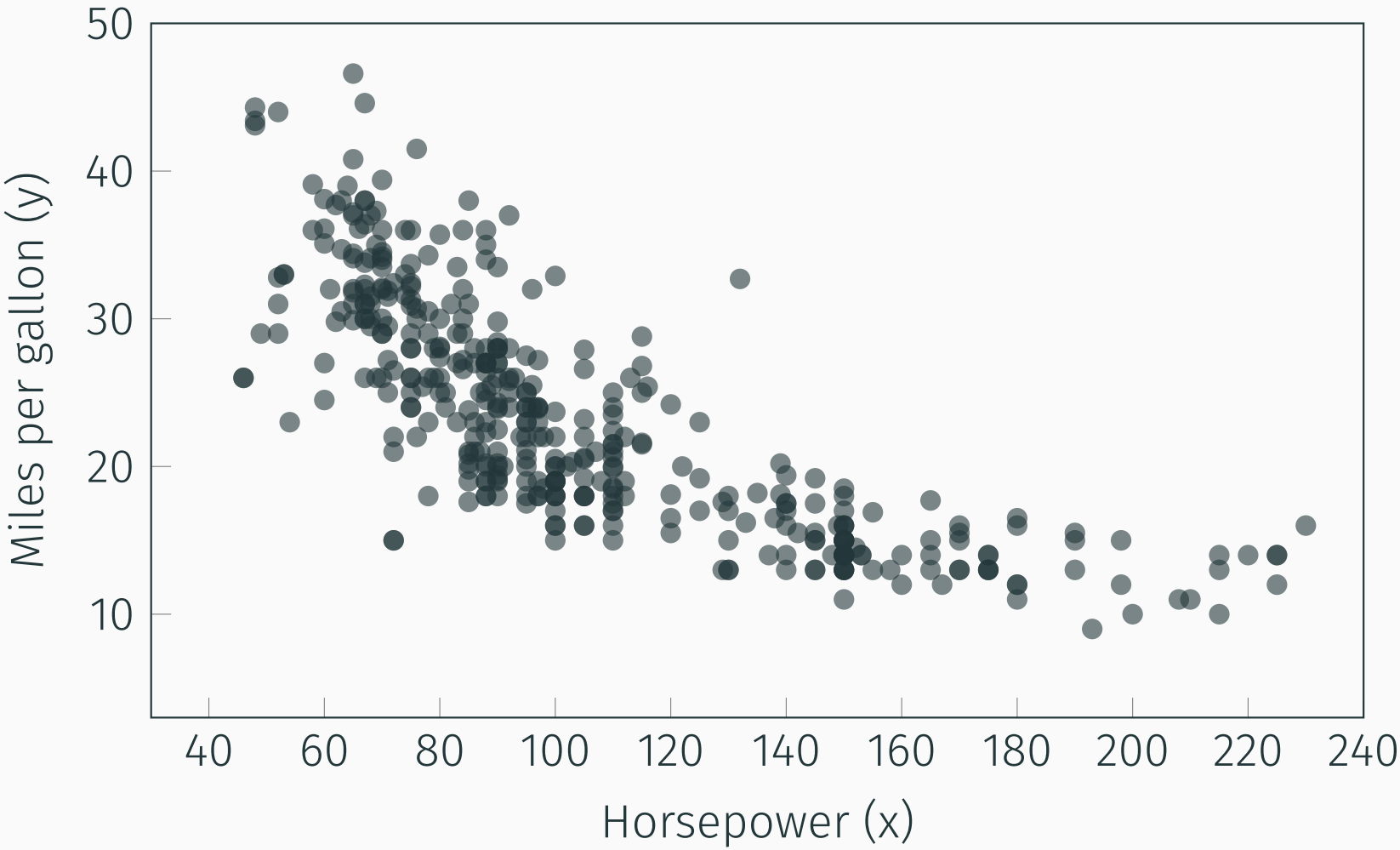
- How do we evaluate how good our models are? (Lecture 3)
- Complex solutions to regression and classification problems (Lecture 4 and onwards)

Regression vs classification

Linear regression (via ordinary least squares)



Linear regression (via ordinary least squares)



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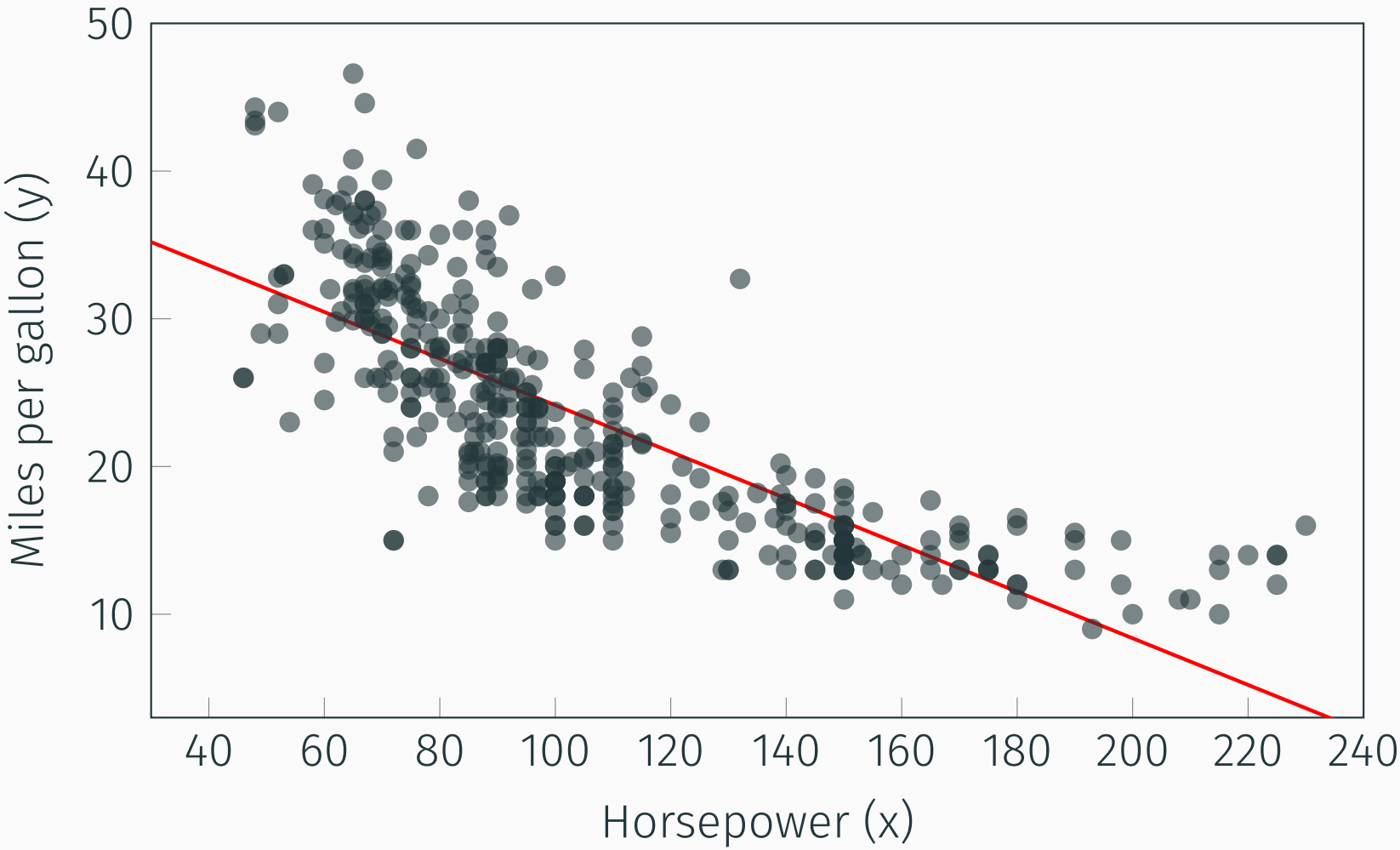

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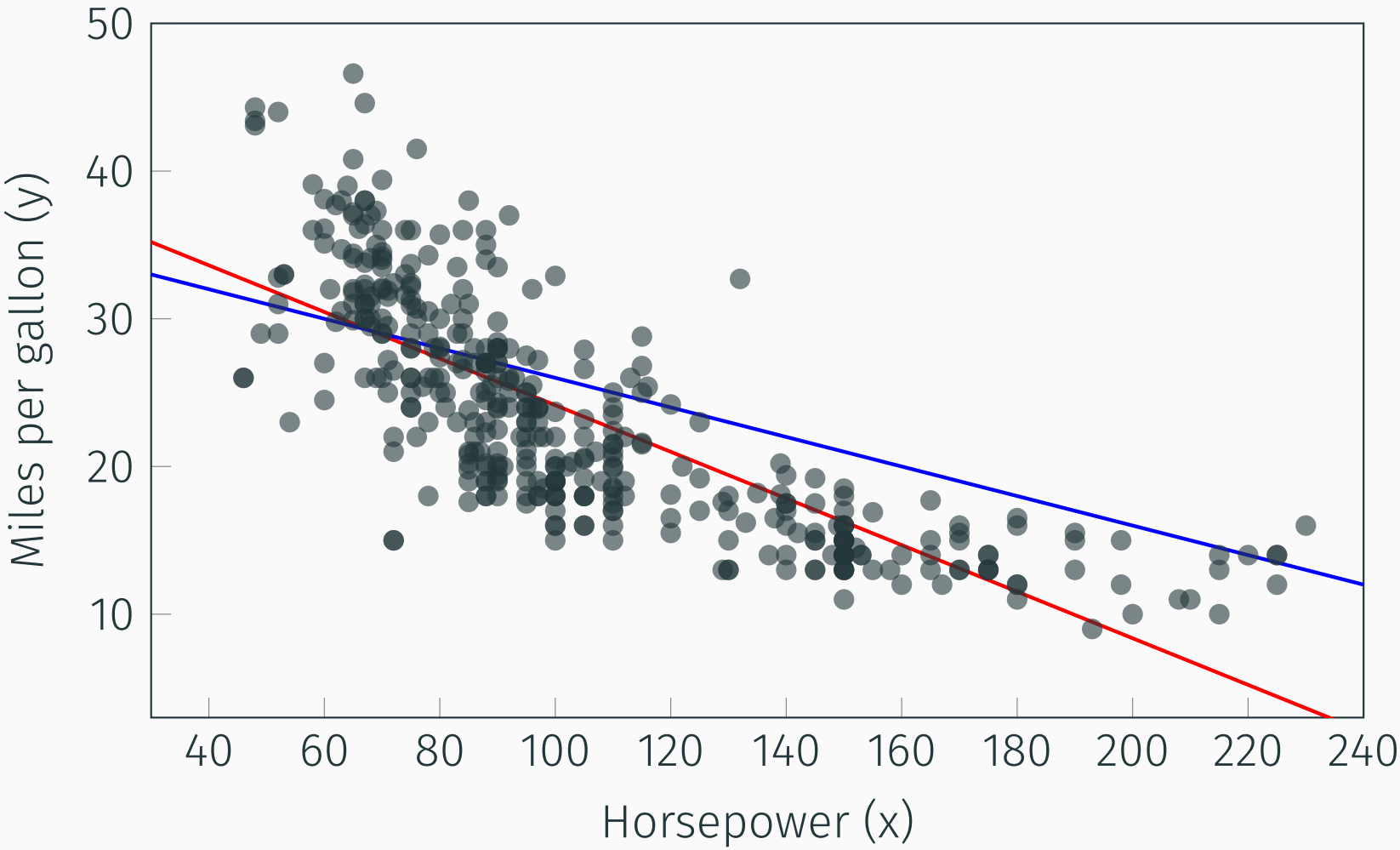
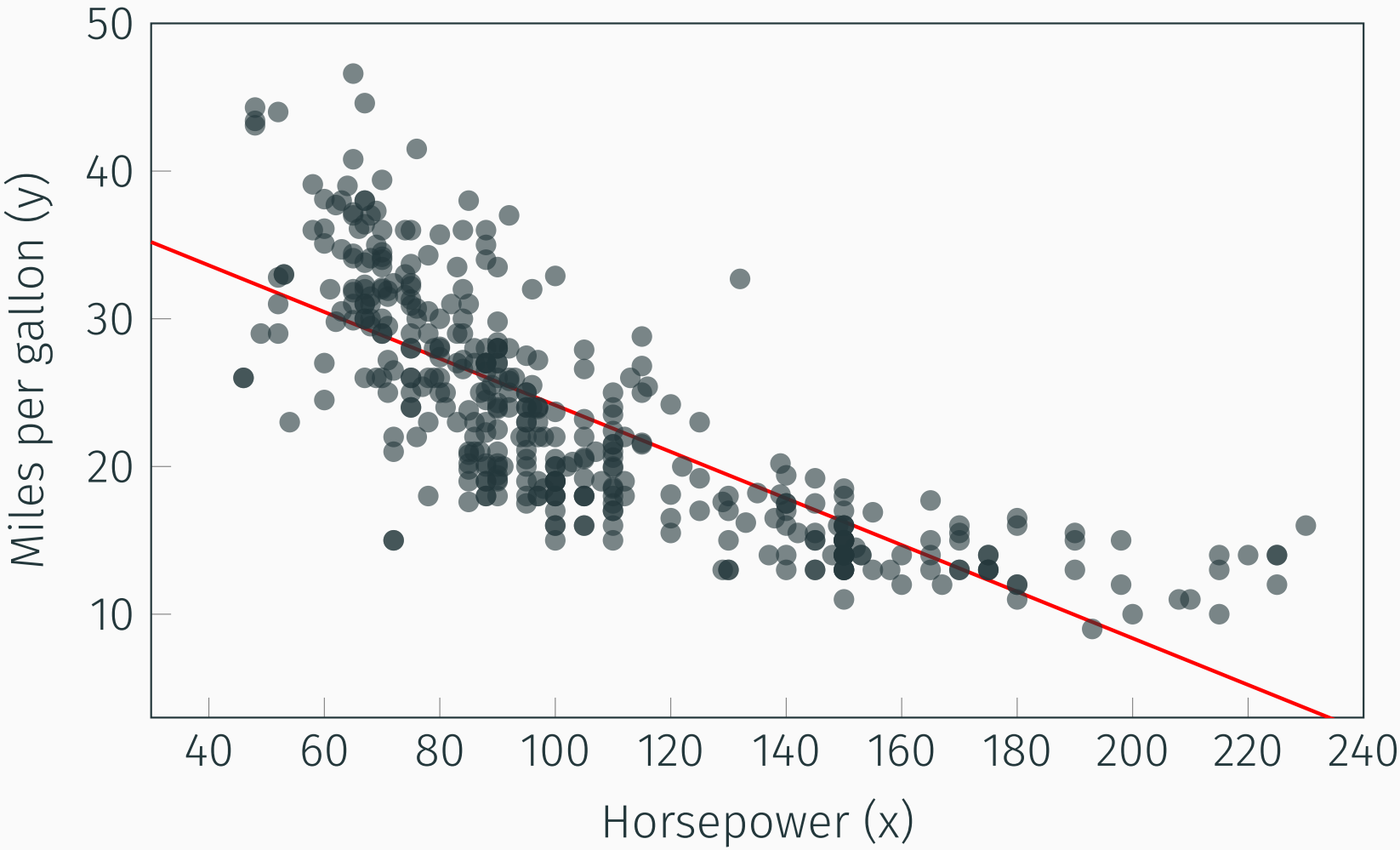
Linear regression (via ordinary least squares)



$$\hat{y} = 39.93 - 0.1578x$$

$$\hat{y} = 36 - 0.1x$$

Linear regression (via ordinary least squares)



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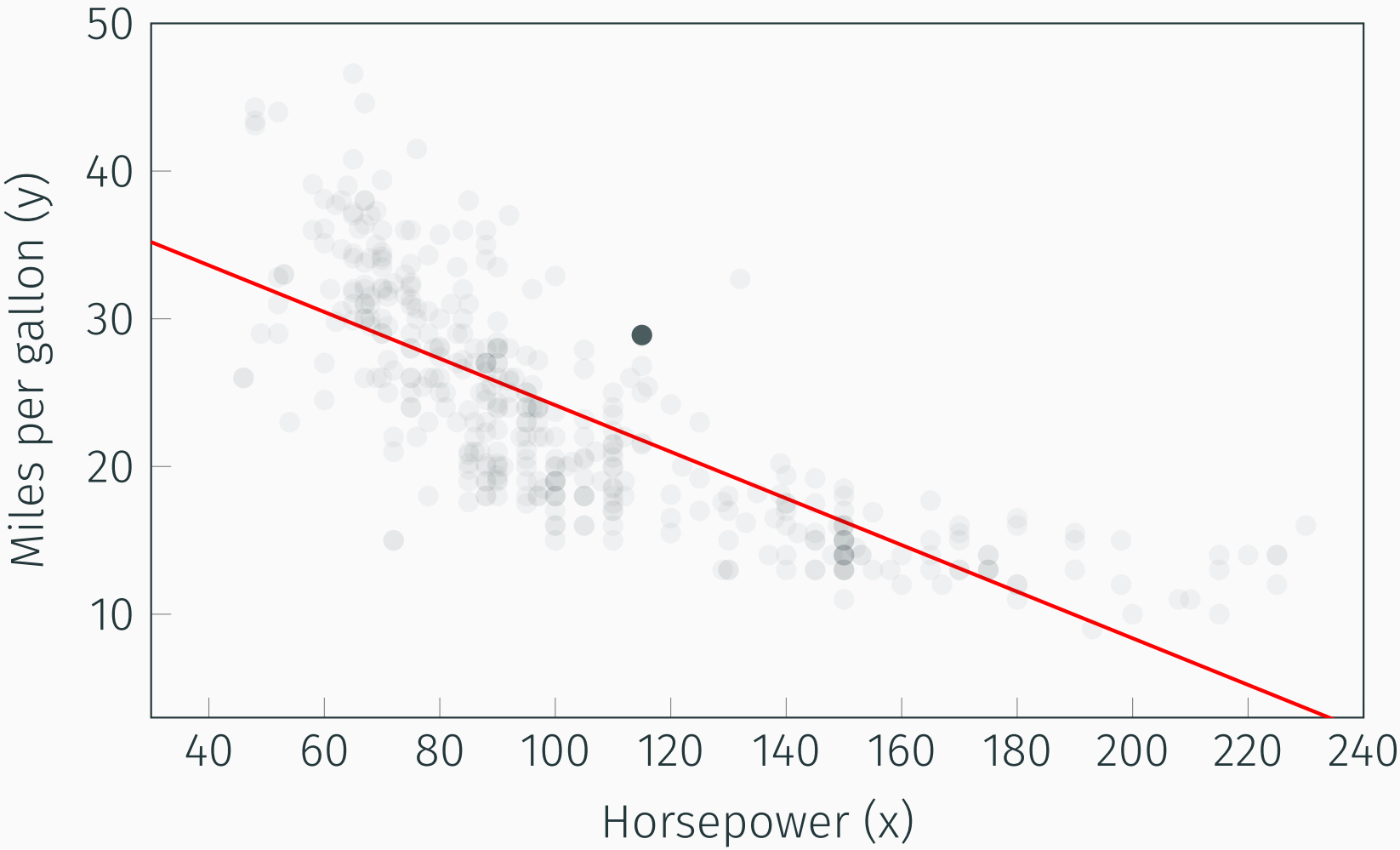

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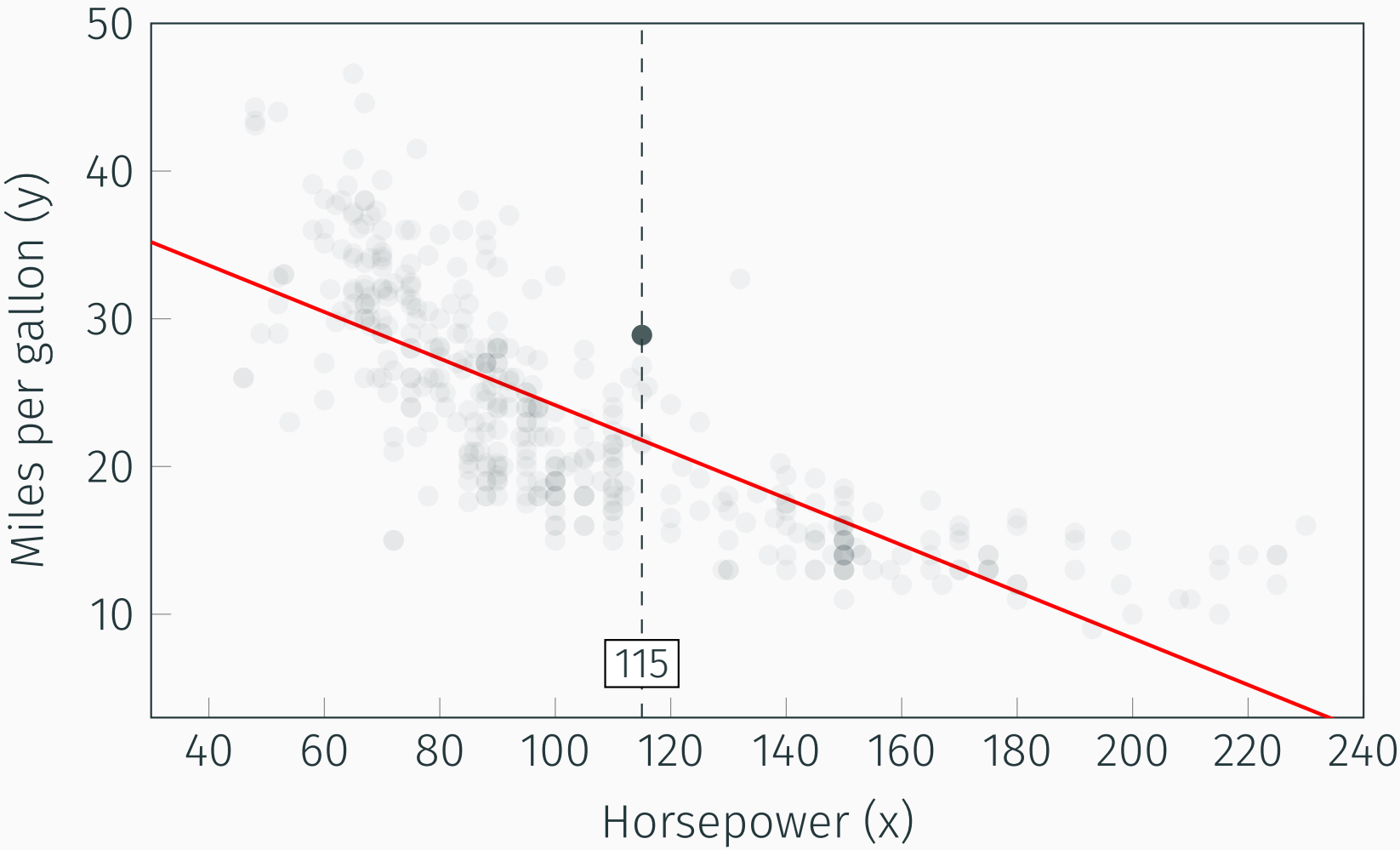

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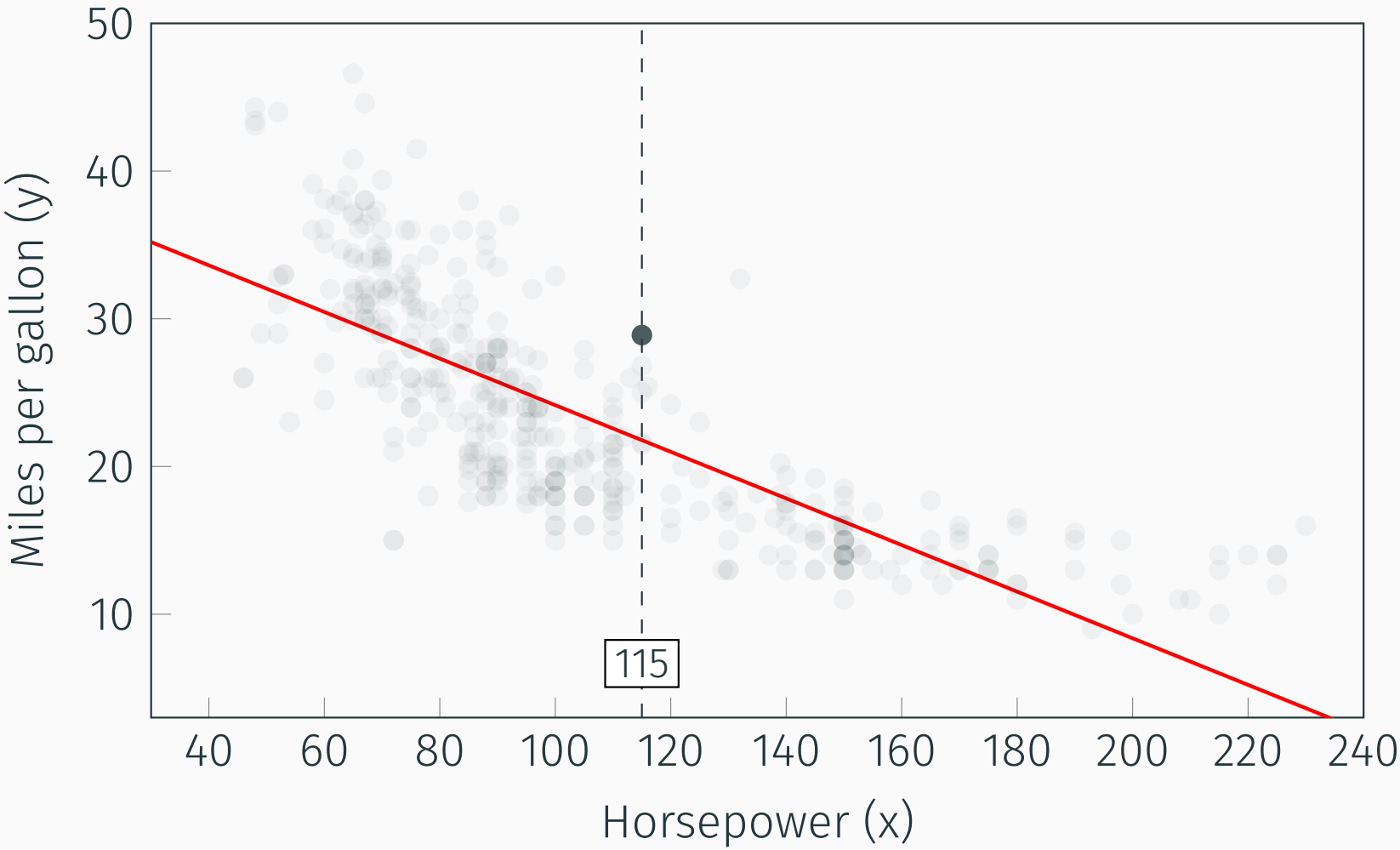
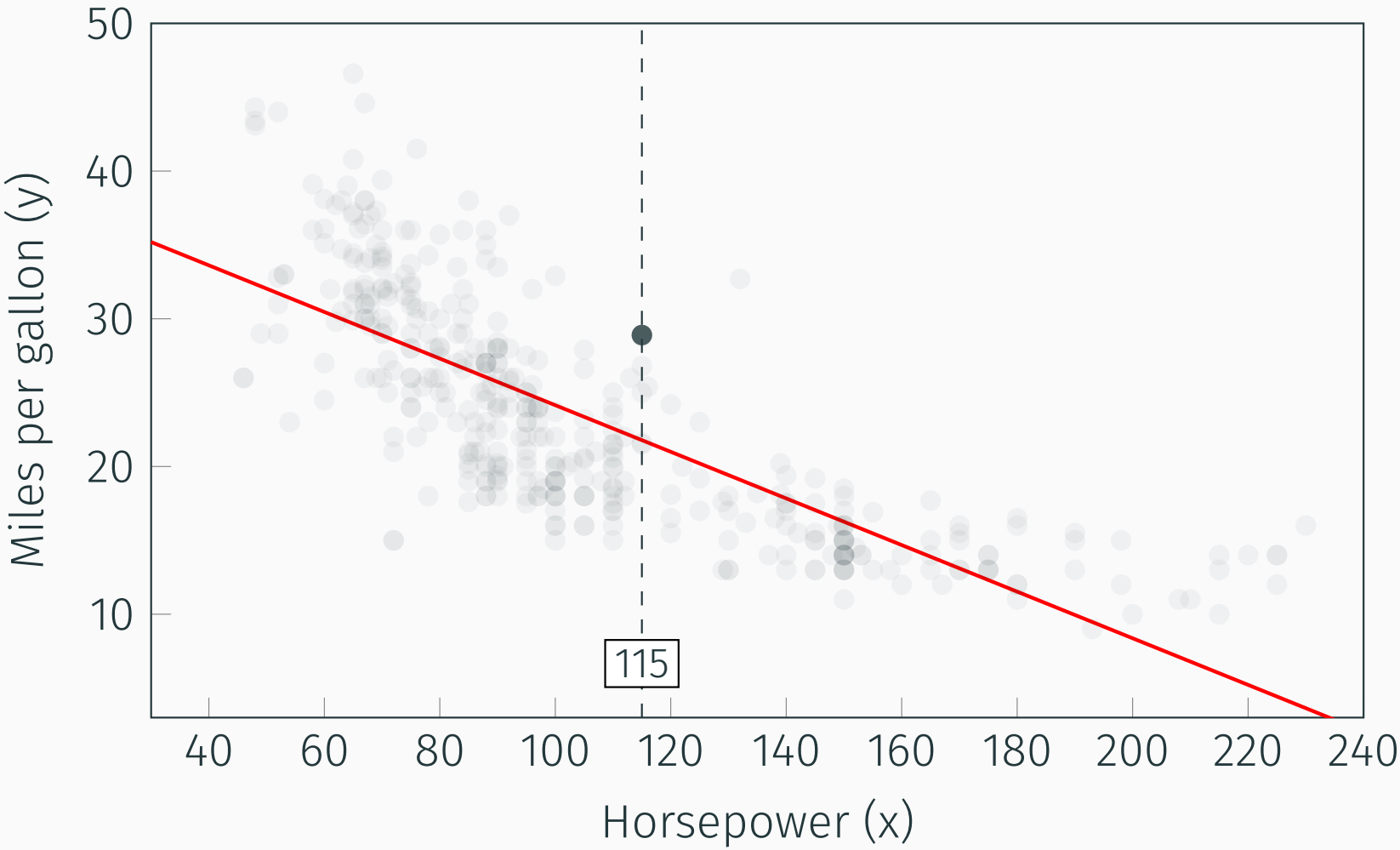


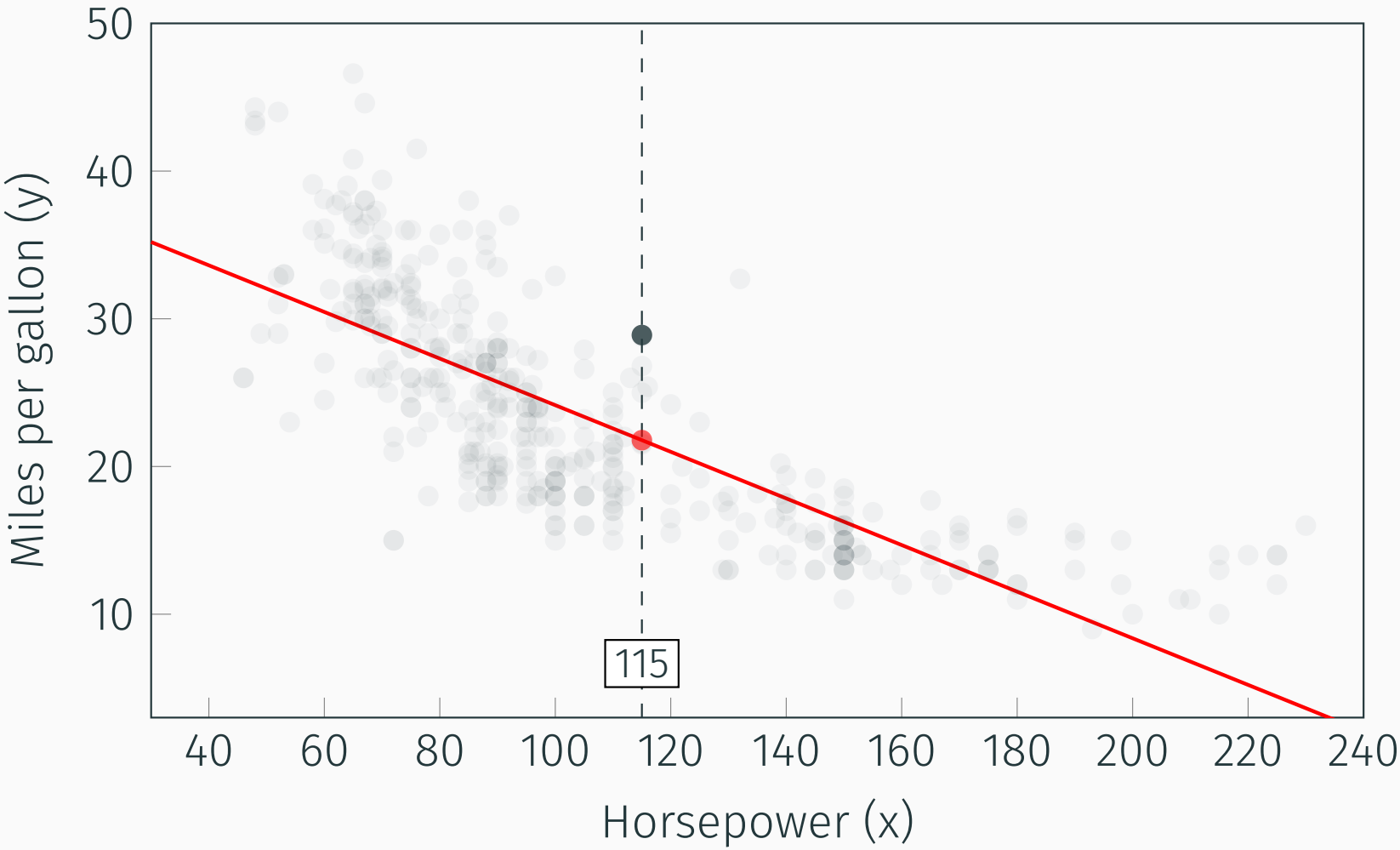
$$\hat{y} = 39.93 - 0.1578 * 115$$

Linear regression (via ordinary least squares)



$$21.78 = 39.93 - 0.1578 * 115$$

Linear regression (via ordinary least squares)



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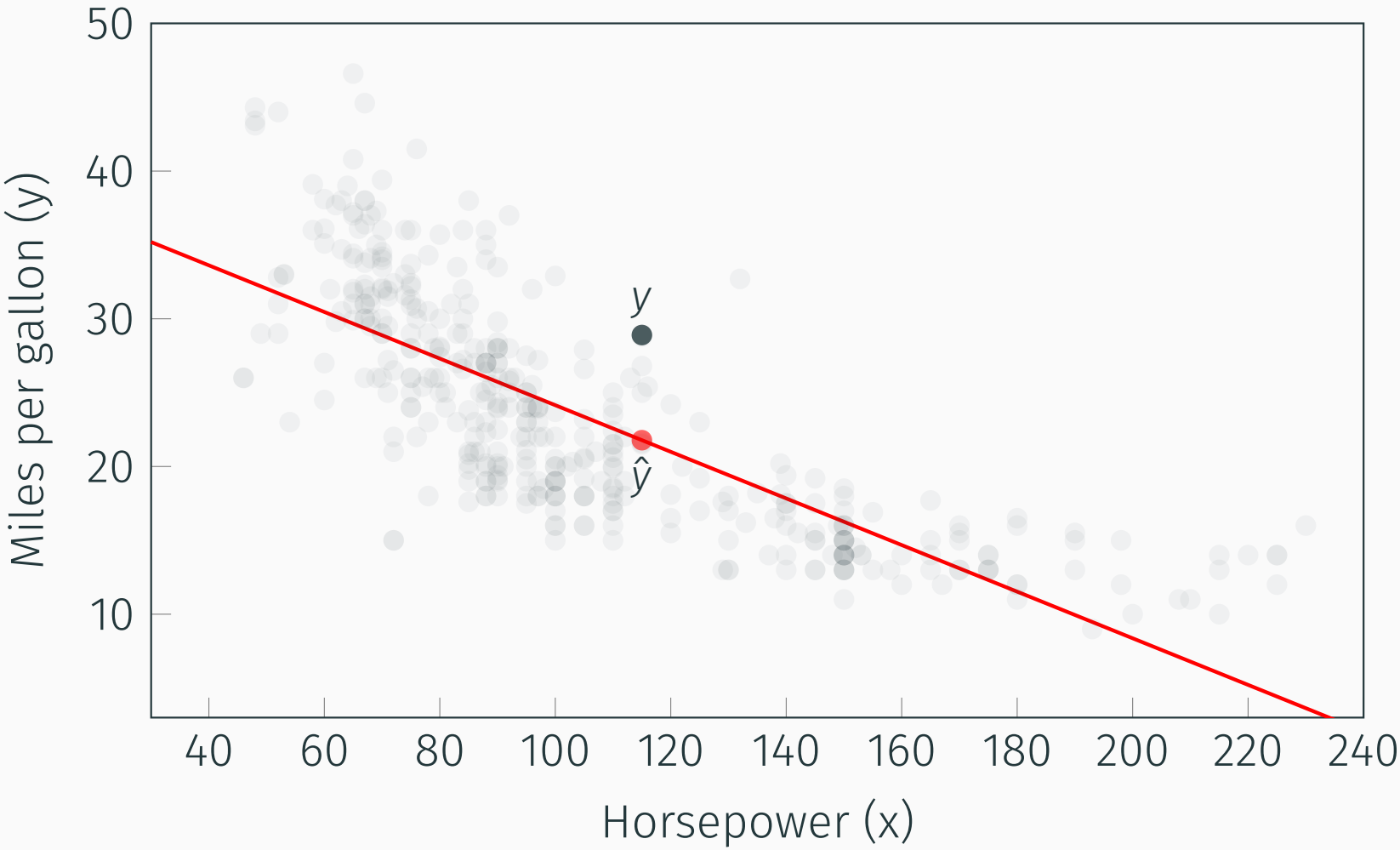
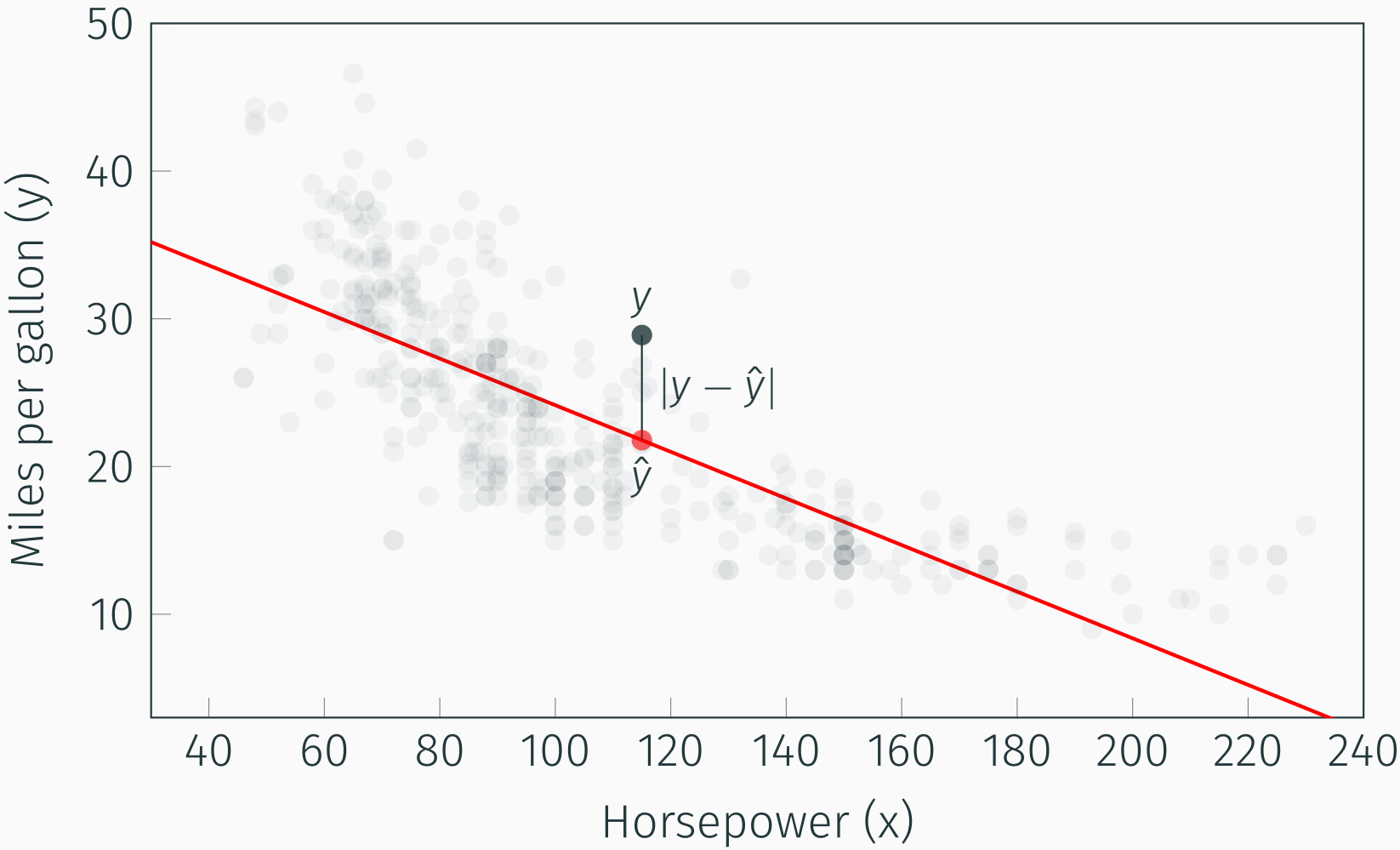
Linear regression (via ordinary least squares)



Linear regression (via ordinary least squares)



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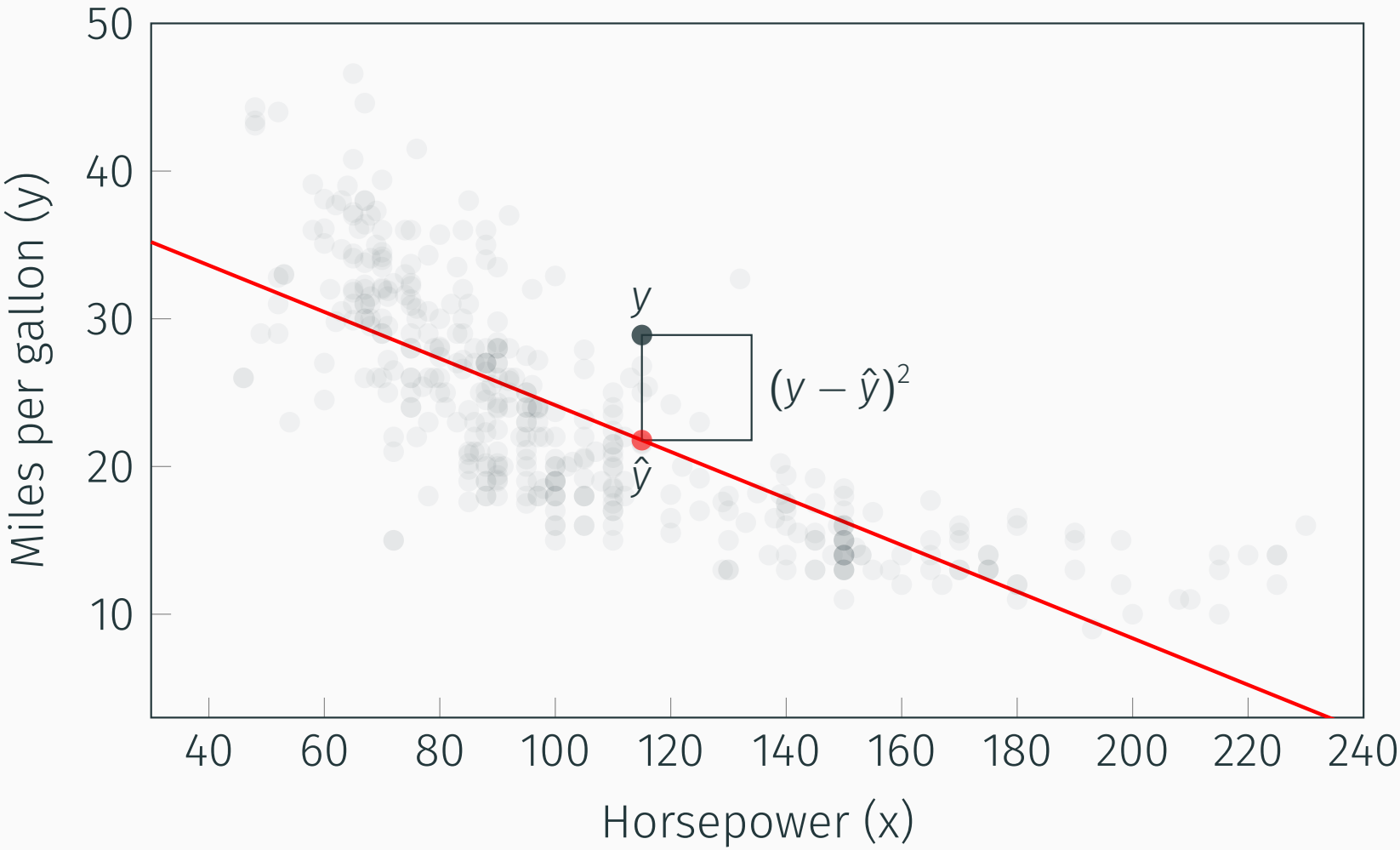

Linear regression (via ordinary least squares)