

# The exam

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*Fundamental Techniques in Data Science with R*

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## What can be tested

The information in the lecture slides:

- An archive of all lecture slides. Or as separate lectures:
  - Lecture 1
  - Lecture 2
  - Lecture 3
  - Lecture 4
  - Lecture 5
  - Lecture 6
  - Lecture 7
  - Lecture 8

and the information in the following sources these lecture slides are based on:

- Introduction to Statistical Learning
    - Chapter 2: up to and including 2.2.2
    - Chapter 3: up to and including 3.4
    - Chapter 4: up to and including 4.3.4
    - Chapter 5: up to and including 5.1
  - These lecture notes.
  - This document I prepared about interpreting cross validation results
  - Chapter XIV on regression in this online book
  - This online page that details the relation between correlation and prediction
  - This blog post by Jonathan Barlett that details  $R^2$  and explains how it is useless on a wrongly specified model
  - This other blog post by Jonathan about adjusted  $R^2$
  - This page on interpreting logistic regression
  - This page on inspecting logistic regression
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## What about equations and formulae?

Your knowledge of matrix algebra will not be tested. So, there is no need to memorize that the regression estimates  $\beta$  can be estimated as  $\hat{\beta} = (\mathbf{X}^T \mathbf{X})^{-1} \mathbf{X}^T y$ . However, you will need to know, understand and apply equations such as:

- $y = \beta_0 + \beta_1 X + \epsilon$  and any more complicated version of this.
- $\epsilon = y - \hat{y}$
- $\mathbb{E}[y] = \alpha + \beta x$ .
- $\log(\text{odds}) = \log\left(\frac{p}{1-p}\right) = \log(p) - \log(1-p) = \text{logit}(p)$
- $p_i = \frac{\exp(\eta)}{1 + \exp(\eta)} = \frac{\exp(\beta_0 + \beta_1 x_{1,i} + \dots + \beta_n x_{n,i})}{1 + \exp(\beta_0 + \beta_1 x_{1,i} + \dots + \beta_n x_{n,i})}$
- etcetera

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**What if you are in doubt?**

If any of the course materials confuse you, drop me a line and I'd be more than happy to explain.

**The second half of the last lecture is dedicated to a Q&A**

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