

Formulas that you are expected to remember

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In general, I do not ask students to memorise formulas for the exam. Rather, students are expected to demonstrate that they are able to understand the formulas. However, some formulas directly represent the core ideas of their underlying approaches. Therefore, if you understand the ideas, you should be able to remember the corresponding formulas. According to that, this document lists the formulas from Weeks 1–4 that you are expected to remember by heart for the ML exam.

Please note that this document is still subject to change, as we have not seen all of the content of Weeks 1–4 yet and I also haven't prepared the exam yet!! However, I'm providing this document at this early stage just to give you a general idea of what I would normally expect in terms of memorisation of formulas for exams. During the module, I may make changes to this document. At the end of the module, I will circulate the final version if there are any changes.

1 Logistic Regression

$$\text{logit}(p_1) = \ln \left(\frac{p_1}{1 - p_1} \right) = \mathbf{w}^T \mathbf{x}$$

$$p_0 = 1 - p_1$$

$$\mathcal{L}(\mathbf{w}) = \prod_{i=1}^N p_{y^{(i)}}$$

$$\ln(\mathcal{L}(\mathbf{w})) = \sum_{i=1}^N \ln p_{y^{(i)}}$$

$$E(\mathbf{w}) = -\ln(\mathcal{L}(\mathbf{w}))$$

2 Gradient Descent and IRLS

$$\mathbf{w} = \mathbf{w} - \eta \nabla E(\mathbf{w})$$

$$\mathbf{w} = \mathbf{w} - H_E^{-1}(\mathbf{w}) \nabla E(\mathbf{w})$$

PS: you do not need to remember the equation corresponding to the gradient and Hessian of the cross entropy loss function, just the general equations above.

3 SVM and Soft Margin SVM

$$f(\mathbf{x}) = \mathbf{w}^T \mathbf{x} + b$$

$$f(\mathbf{x}) = \mathbf{w}^T \phi(\mathbf{x}) + b$$

$$f(\mathbf{x}) = \sum_{n \in S} a^{(n)} y^{(n)} k(\mathbf{x}, \mathbf{x}^{(n)}) + b$$

PS: you do not need to remember the formula for calculating b .