Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4267 Linear statistical models
Recommended exercises 6 – solutions

Problem 1 Orthogonally projecting matrices

Assume $R^{\mathrm{T}}(I - R) = O$. Then $R^{\mathrm{T}} = R^{\mathrm{T}}R$, so that $R = (R^{\mathrm{T}}R)^{\mathrm{T}} = R^{\mathrm{T}}R = R^{\mathrm{T}}$, so R is symmetric. Then from $R^{\mathrm{T}} = R^{\mathrm{T}}R$ we have $R = RR = R^2$, showing that R is idempotent.

Conversely, if R is symmetric and idempotent, $R^{\mathrm{T}}(I - R) = R(I - R) = R - R^2 = O$.

Problem 2 Period of swing of pendulum

Exam TMA4267 2015 spring, Problem 1 – link to solutions

Problem 3 Galápagos species

Exam TMA4267 2014 spring, Problem 2 – links to solutions