MTAT.05.008 Fou Math

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Homework # 04

Handed out:	Oct. 17
Due:	Oct. 31
In TeX as PDF by email to	`dotheis@ut.ee`
Subject:	`FOUMATH-HW04-`*lastname*

Problem 1

For $A := \left(\begin{smallmatrix} 0 & 1 \\ 0 & 0 \end{smallmatrix}\right)$, find $\exp(A)$.

Problem 2

Find $\exp(A)$ where

$$A := \begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix}.$$

Problem 3

For all positive integers n, an $(n \times n)$-matrix M is called *upper triangular,* if $M_{k,\ell} = 0$ for all k, ℓ with $1 \leq \ell < k \leq n$.

Let A be an upper triangular n-by-n matrix with complex entries, and m a nonnegative integer. Describe the diagonal entries of A^m.

Problem 4

Let U, V be a n-by-n matrices with complex entries such that $UV = VU = \mathbf{1}$ (the identity matrix, 1's on the diagonal and otherwise 0).

Let A be a complex n-by-n matrix, and assume $E := \exp(A)$ is known. Find a way to express $\exp(UAV)$ in terms of E.