

## MATH 226

### Differential Equations

#### Assignment 16

Due Friday, April 18

**Read** Section 7.1: “Autonomous Systems and Stability” of Chapter 7: *Nonlinear Differential Equations and Stability*

### Problems

#### 6.5 Fundamental Matrices and the Exponential of a Matrix

*Maple* will be useful for part of the starred problem.

**Practice Problems:** 1, 6, 9, 13, 15, 16

**Feedback Problems:** 13, 16

#### 6.6 Nonhomogeneous Linear Systems

**Practice Problems:** 2, 5, 9

**Feedback Problems:** 5

In contrast to what we did in class, in most cases, calculations will be simpler for variation of parameters if you use a different fundamental matrix than the matrix exponential for solutions. The process, however, remains the same. See also the Maple worksheets *Variation of Parameters 1* (using Matrix Exponential) and *Variation of Parameters* (using any Fundamental Matrix)

$$e^{\mathbf{A}t} = \mathbf{I}_n + \mathbf{A}t + \frac{1}{2!}\mathbf{A}^2t^2 + \frac{1}{3!}\mathbf{A}^3t^3 + \dots = \sum_{k=0}^{\infty} \mathbf{A}^k \frac{t^k}{k!}$$