

**MATH 355**  
**HOMEWORK 8**

SPRING 2019

The following assignment is to be turned in on  
**Tuesday, March 26, 2019.**

**Reading:**

Read Chapter 5.

**Suggested Problems (not to be handed in):**

Chapter 5: Pages 183-191 of the text (or 205 - 213 in the pdf file):  
5.31, 5.33, 5.37, 5.38

**Hand-In Homework:**

Chapter 5: Pages 183-191 of the text (or 205 - 213 in the pdf file):  
5.27, 5.32, 5.35, 5.36

Also prove the following:

Let

$$A(t) = \begin{pmatrix} a(t) & b(t) \\ c(t) & d(t) \end{pmatrix} \quad \text{with} \quad \tilde{x}(t) = \begin{pmatrix} x(t) \\ y(t) \end{pmatrix}$$

Assume all entries above are differentiable. Show that the function  $\tilde{y}(t) = A(t)\tilde{x}(t)$  satisfies the product rule in the sense that

$$\tilde{y}'(t) = A'(t)\tilde{x}(t) + A(t)\tilde{x}'(t)$$

To be clear, the matrix  $A'(t)$  is defined as

$$A'(t) = \begin{pmatrix} a'(t) & b'(t) \\ c'(t) & d'(t) \end{pmatrix}$$