University of Oslo
Department of Economics

ECON3120/4120 – Mathematics 2, spring 2011

Something to do before the seminars start

Try your hand at the following problems before you come to class on Friday:

From MA1, 8th edition:

5.10.1, 5.10.4, 5.10.5, 5.11.2, 5.11.5, 5.11.9.

In the 7th edition the numbers are

5.10.1, 5.10.4, *), 5.11.2, 5.11.5, 5.11.8.

and in EMEA,

6.10.1, 6.10.5, 6.10.6, 6.11.2, 6.11.7, 6.11.9.

*) Problem 5.10.5 in MA1, 8th edition, is not in the 7th edition. The problem is to find the intervals where the following functions are increasing ("voksende"):

$$\text{(a)}\ \ y = \frac{x^2}{e^{2x}}\,, \qquad \text{(b)}\ \ y = e^x - e^{3x}\,, \qquad \text{(c)}\ \ y = \frac{e^{2x}}{x+2}\,.$$

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Problem set 1 (Week 6)

- From the Compendium of old exam problems (link):

Problem 18 (You may want to wait until Friday's lecture for this problem.)

Problem 22

Problem 97

Problem 107

Problem 117 (Same as Problem 18 applies here too.)

Exercise on Taylor approximation:
(a) Find the general n-th order Taylor approximation of $f(x) = e^x$ near $x = 0$.
(b) Suppose we want to approximate e with an error less than $q\%$ of the true value. How large should n be?

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Problem set 2 (Week 7)

- From the Compendium of old exam problems (link):

Problem 43

Problem 49

Problem 88 /a

Problem 94

Problem 100 /a /b

Problem 126

Friday's lecture (on February 8-th) will be helpful for the integration problems.

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Problem set 3 (Week 9)

- From the Compendium of old exam problems (link):

Problem 77

Problem 88 /b

Problem 100 /c

Problem 109

Problem 111

Problem 120

Problem 127

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Problem set 4 (Week 10)

- From the Compendium of old exam problems (link):

Problem 21

Problem 53 /a /b

Problem 104

Problem 84

Problem 120 (Solve as linear differential equations this time.**)**

Problem 134

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Problem set 5 (Week 11)

P1. **The price vector is (4,2,5) and you can just afford to buy the commodity vector (6,4,3). What is your budget constraint?**

P2. **Write the following systems of equations in matrix notation:**

(a)
$$\begin{array}{rcrcl} 2x_1 & - & 5x_2 & = & 3 \\ 5x_1 & + & 8x_2 & = & 5 \end{array}$$

(b)
$$\begin{array}{rcrcrcl} ax & + & y & + & (a+1)z & = & b_1 \\ x & + & 2y & + & z & = & b_2 \\ 3x & + & 4y & + & 7z & = & b_3 \end{array}$$

(c)
$$\begin{array}{rcrcrcrcl} x & + & y & + & z & + & t & = & a \\ x & + & 3y & + & 2z & + & 4t & = & b \\ x & + & 4y & + & 8z & & & = & c \\ 2x & + & & + & z & - & t & = & d \end{array}$$

P3. **From the textbook** **(choose either the English or the Norwegian textbook)**

- **EMEA:** 15.7.3, 15.7.8, 15.8.2, 15.8.4, 15.3.3, 15.4.6 (the English textbook)
- **LA:** 2.1.5, 2.2.4, 2.3.2, 2.3.3, 3.2.5, 3.3.6 (the Norwegian textbook)

P4. **From the Compendium of old exam problems (link):**

Problem 52 /c

Problem 59 /a /c

P5. **Exam of Spring 2009, problem 4 (link_2)**

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Problem set 6 (Week 12)

- Note: Regarding problems that involve the determinant of a matrix, this will be introduced in the lecture on Friday, March 15-th.

P1. **Use Gaussian elimination to discuss what are the possible solutions of the following system for different values of a and b.**

$$\begin{array}{rcrcrcl} x & + & y & - & z & = & 1 \\ x & - & y & + & 2z & = & 2 \\ x & + & 2y & + & az & = & b \end{array}$$

P2. **Find the values of c for which the system below has a solution, and find the complete solution for these values of c.**

$$\begin{array}{rcrcrcrcl} 2w & + & x & + & 4y & + & 3z & = & 1 \\ w & + & 3x & + & 2y & - & z & = & 3c \\ w & + & x & + & 2y & + & z & = & c^2 \end{array}$$

P3. **Consider the following two systems of equations. Find the values of a for which (a) has a unique solution, and find all the solutions to system (b).**

(a)
$$\begin{array}{rcrcrcl} ax & + & y & + & (a+1)z & = & b_1 \\ x & + & 2y & + & z & = & b_2 \\ 3x & + & 4y & + & 7z & = & b_3 \end{array}$$

(b)
$$\begin{array}{rcrcrcl} \frac{3}{4}x & + & y & + & \frac{7}{4}z & = & b_1 \\ x & + & 2y & + & z & = & b_2 \\ 3x & + & 4y & + & 7z & = & b_3 \end{array}$$

P4. From the Compendium of old exam problems (link):

Problem 5

Problem 69

Problem 142