

ECON3120/4120 Mathematics 2, spring 2007

Problems for Thursday 22 February 2007

From the textbook:

MA II: 1.1.2, 1.3.3(b), 1.4.3(b) = **FMEA:** 5.1.3, 5.3.3(b), 5.4.7(b)

From the exam problem collection:

Problem 53(b)

The function $x = x(t)$ is differentiable, with $x(0) = 0$ and $\dot{x} = (1 + x^2)t$ for all t . Prove that $t = 0$ is a (global) minimum point for $x(t)$, and show that the function $x(t)$ is convex.

Problem 88

(a) Find the integrals:

$$(i) \int 3xe^{-x/2} dx \quad (ii) \int_0^{25} \frac{1}{9 + \sqrt{x}} dx \quad (iii) \int_2^7 t\sqrt{t+2} dt$$

(b) In auction theory one encounters the differential equation

$$\dot{x} = \frac{4(a-t)}{(2t-a)^2}x, \quad t > a/2$$

where a is a constant. Find the general solution of this equation.

Problem 137

Calculate the integrals (a) $\int_4^9 \frac{(\sqrt{x}-1)^2}{x} dx$ (b) $\int_0^1 \ln(1 + \sqrt{x}) dx$