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Differential Equations (MTH4102) Problem Sheet 2

Problem 4

For each of the following differential equations compute the general solution by integration, fix the constant of integration according to the initial condition $y(0) = 1$, and sketch this particular solution in a diagram.

a) $y' = 3x^2 + 2x + 3$

b) $y' = -2\sin(2x) + 2\cos(2x)$

c) $y' = (x + 1)e^{-x^2 - 2x}$

d) $y' = e^{-x} \cos(x)$

e) $y' = 3/(1 - x)$

Problem 5

Assign to each of the following differential equations the correct solution.

A) $y' = x/(y - 1)$

I) $y(x) = 1 + x^2$

B) $y' = y(1 + x)/x$

II) $y(x) = x/(1 - x)$

C) $y' = y(1 + y)/x$

III) $y(x) = 1 + \sqrt{1 + x^2}$

D) $y' = 2\sqrt{y - 1}$

IV) $y(x) = xe^x$

E) $y' = -\sqrt{1 - y^2}$

V) $y(x) = \cos(x - 1)$

Problem B Homework

- a) Find the general solution of the differential equation

$$y' = \frac{-4x}{1 + 4x^2 + 4x^4}$$

by integration. Fix the constant of integration according to the initial condition $y(0) = 2$. Sketch the solution in a diagram.

- b) Does

$$y = \frac{x^2}{\sqrt{1-x}}$$

solve the differential equation

$$y' = \frac{2y}{x} - \frac{y^3}{2x^3} \quad ?$$

- c) Compute the general solution of the differential equation

$$y' = 3^x$$

**Homework, and homework only, to be handed in during week 3 tutorials,
Wed/Thurs/Fri 26/27/28 Jan 2011**