

Assignment 2 for MTH 131: Fall 2006

Due date: Wednesday September 20.

Problems assigned from Logan's text

2). ODE's – analytical solutions

a) [Logan p.18: Problem #3]

Find a function $u(t)$ that satisfies the initial value problem $u'' = -3\sqrt{t}$, $u(1) = 1$, $u'(1) = 2$.

b) [Logan p.18: Problem #4]

Find all state functions that solve the differential equation $u' = te^{-2t}$.

c) [Logan p.57: Problem #1]

Find the general solution in explicit form of the following equations.

$$u' = \frac{2u}{t+1}; \quad u' = \frac{t\sqrt{t^2+1}}{\cos u}; \quad u' = (t+1)(u^2+1); \quad u' + u + \frac{1}{u} = 0$$

d) [Logan p.58: Problem #4]

Find the general solution in implicit form to the equation

$$u' = \frac{4-2t}{3u^2-5}$$

Find the solution when $u(1) = 3$ and plot the solution. What is its interval of existence?

e) [Logan p.67: Problem #3]

Show that the general solution to the ODE $u' + au = \sqrt{1+t}$ is given by

$$u(t) = Ce^{-at} + \int_0^t e^{-a(t-s)} \sqrt{1+s} ds$$