

HOMEWORK 2

Due: 09/12/2016

1. TEXTBOOK EXERCISES

2.4: 9, 14, 22

2.5: 3, 22

2.6: 5, 11, 18, 21, 25

2. ADDITIONAL QUESTIONS

A1: For the differential equation

$$\frac{dy}{dx} = y^{1/5},$$

find a solution defined on $-\infty < x < \infty$ with the initial value $y(0) = 1$, and call this solution $y_1(x)$. Then find a solution defined on $-\infty < x < \infty$ with the initial value $y(0) = 0$, naming it $y_2(x)$. Is it possible for the graphs of these two solutions to intersect (more precisely, touch) each other? Explain.

A2: Now try to answer **Question 6** in Prof. Nolen's *Additional Homework Problems* (available on Sakai).

A3: If we assume that the Logistic model is modified by considering continuous harvesting at a rate that is *proportional* to p , then this new model can be written as

$$\frac{dp}{dt} = p(1 - p) - hp,$$

where $h > 0$ is a constant. Make a plot for the phase-line associated to this model, with the equilibrium solutions and their stability marked.

A4: Write down an exact first order ODE which is not separable.