

MAT 127: Calculus C, Fall 2009 Homework Assignment 3

Problem Set 3 is due by the beginning of lecture on
Wednesday, 09/23 if enrolled in L01, L02
Thursday, 09/24 if enrolled in L03, L04

Please read Section 7.3 thoroughly before starting on the problem set.

Problem Set 3: 7.3 3,10,16,24*; Problem C (see below)

*make a large-size detailed sketch without use of any “graphing device”; the sketch should include at least 3 members of the original family of curves and at least 3 members of the orthogonal family of curves.

Show your work; correct answers without explanation will receive no credit, unless noted otherwise.

Please write your solutions legibly; the graders may disregard solutions that are not readily readable. All solutions must be stapled (no paper clips) and have your name and lecture number in the upper-right corner of the first page.

Problem C

An example of a function $f = f(y)$ qualitatively matching the graph in Section 7.2, Problem 18 is

$$f(y) = (y^2 - 1)(y^2 - 4).$$

(a) Find the general solution to the differential equation

$$y' = (y^2 - 1)(y^2 - 4), \quad y = y(x).$$

You can leave your answer as an implicit definition of y in terms of x , but in a reasonably simple form (no absolute values or logarithms in the final answer please). Make sure your general solution does not miss any solution of the equation.

(b) Using the general solution, show that the solutions of the equation qualitatively behave as predicted by the solution to Section 7.2, Problem 18.

Hint: this is the harder part, though it hardly goes beyond pre-calculus.