

## MATH 240 - Extra credit problems - Summer 2009

**Due date: Wednesday, July 29.** Please bring your solutions to your instructor during regular class time. Do not put them in the homework drop boxes. You may solve one or several or all problems. To receive credit you must show all your work. There will be no credit given just for turning them in, you must present a correct solution or at least a part of it. You may use any books or notes or other information, but please work on your own and do not ask for help on help sessions. You may find it helpful to review the corresponding section of the textbook, but there will no direct formula in the book to use.

If you have any questions, e-mail me at [ostapyuk@math.ksu.edu](mailto:ostapyuk@math.ksu.edu).

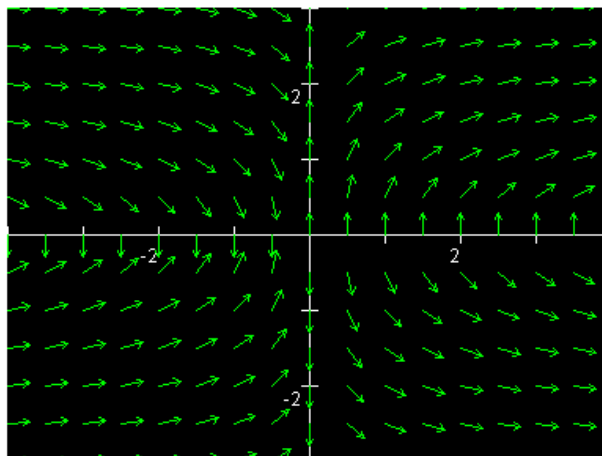
**1** (4 pts) (Section 1.6)

Find all solutions to the equation:  $y' = 1 - x^2 + 2xy - y^2$

(Hint: You need to use a substitution other than those in the book).

**2** (2 pts) (Section 1.7 and Lab 1)

Below is the slope field for  $y = f(x, y)$ . Where is the function  $f(x, y)$  positive, negative, and zero? Is  $f(x, y)$  a function of  $x$  alone,  $y$  alone, or a function of both variables together? Find a function  $f(x, y)$  whose slope field looks like this?



**3** (4 pts) (Section 2.11)

A mass of  $1\text{kg}$  is attached to a spring causing it to stretch  $5\text{cm}$ . There is damping,

but it is unknown. The spring is then set into free motion. What is the range of the possible values for the quasiperiod? Use  $g = 9.8m/sec^2$ . (The quasiperiod was defined in problem 11 on the page 112 in the textbook.)

**4** (2 pts) (Section 3.1)

Find the Laplace transform:  $\mathcal{L}\{\sin t \cos t\} =$

**5** (2 pts) (Section 3.5)

Simplify the following:  $u(t - 2)u(t - 3)u(t - 7) =$

**6** (4 pts) (Section 3.6)

Do problem 10 on the page 162 from the textbook.