Fall, 2014

MATH 3500(H)
PROBLEM SET #4

T. Shifrin

DUE Wednesday, September 17, 2014.

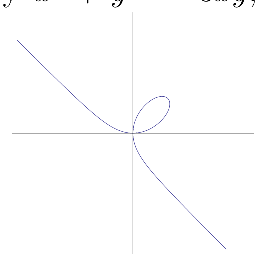
Problems to work but not hand in:

§2.2: #1, 5, 10.

Problems to turn in:

WeBWork Homework 4

A. (3) Consider the curve given by $x^3 + y^3 = 3xy$, pictured below.



(i) Parametrize it by letting t represent the slope of a line through the origin.

(ii) What happens as $t \to -1$? Consider $\lim\limits_{t\to -1} \big(x(t) + y(t)\big)$. What do you conclude?

(iii) The curve has an obvious symmetry. Verify this using your parametrization.

B. (2) Consider the surface $z = f\begin{pmatrix} x \\ y \end{pmatrix} = xy$. Given a point $P = \begin{bmatrix} a \\ b \\ ab \end{bmatrix}$ on this surface, show that the lines with direction vectors $\mathbf{u} = \begin{bmatrix} 1 \\ 0 \\ b \end{bmatrix}$ and $\mathbf{v} = \begin{bmatrix} 0 \\ 1 \\ a \end{bmatrix}$ through P are entirely contained in the surface.

§2.2: #2 (3), 3 (2), 7a (3).

Challenge problems (Turn in separately):

§2.1: #2b (2), 5 (4), 6 (2), 7 (4), 12 (4).