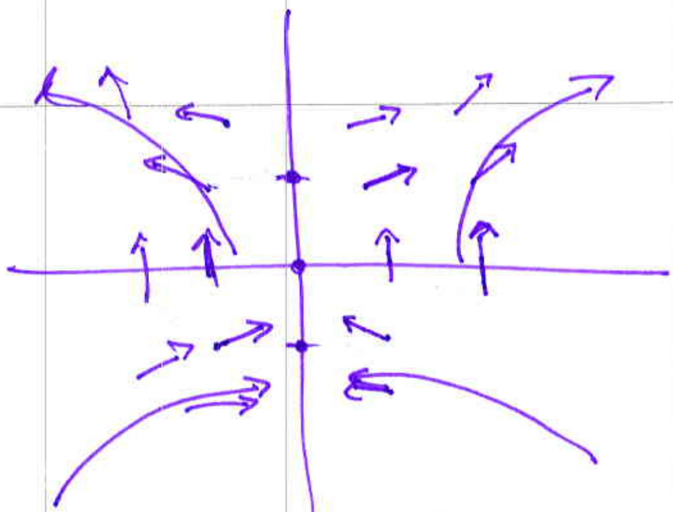
Math 2153, Quiz #5, Spring 2014 Name KEY

Instructions: Show all work. Use exact answers unless specifically asked to round. Be sure to complete all parts of each question.

1. Sketch the vector field $\vec{F}(x,y) = 2xy\hat{\imath} + x^2\hat{\jmath}$. Plot at least 10 points or more to determine the general behavior of the field.

(x,y)	$\langle 2xy, x^2 \rangle$
$(0,0)$	$\langle 0,0 \rangle$
$(1,0)$	$\langle 0,1 \rangle$
$(0,1)$	$\langle 0,0 \rangle$
$(-1,0)$	$\langle 0,1 \rangle$
$(0,-1)$	$\langle 0,0 \rangle$
$(1,1)$	$\langle 2,1 \rangle$
$(1,-1)$	$\langle -2,1 \rangle$
$(-1,1)$	$\langle -2,1 \rangle$
$(-1,-1)$	$\langle 2,1 \rangle$
$(2,1)$	$\langle 4,4 \rangle$



See page 2 for complete graph

2. Find the value of the line integral $\int_C (x+y^2)ds$ along the curve $\vec{r}(t) = \cos t\,\hat{\imath} + \sin t\,\hat{\jmath}$. $[0, 2\pi]$

$$\int_0^{2\pi} \cos t + \sin^2 t \, dt =$$

$$\int_0^{2\pi} \cos t + \tfrac{1}{2} + \tfrac{1}{2}\cos 2t \, dt$$

$$\cancel{\sin t} + t + \cancel{\tfrac{1}{4}\sin 2t} \Big|_0^{2\pi} = 2\pi$$

$ds = \|r'(t)\|dt$

$r'(t) = -\sin t\,\hat{\imath} + \cos t\,\hat{\jmath}$

$\|r'(t)\| = \sqrt{\sin^2 t + \cos^2 t} = 1$

$ds = dt$

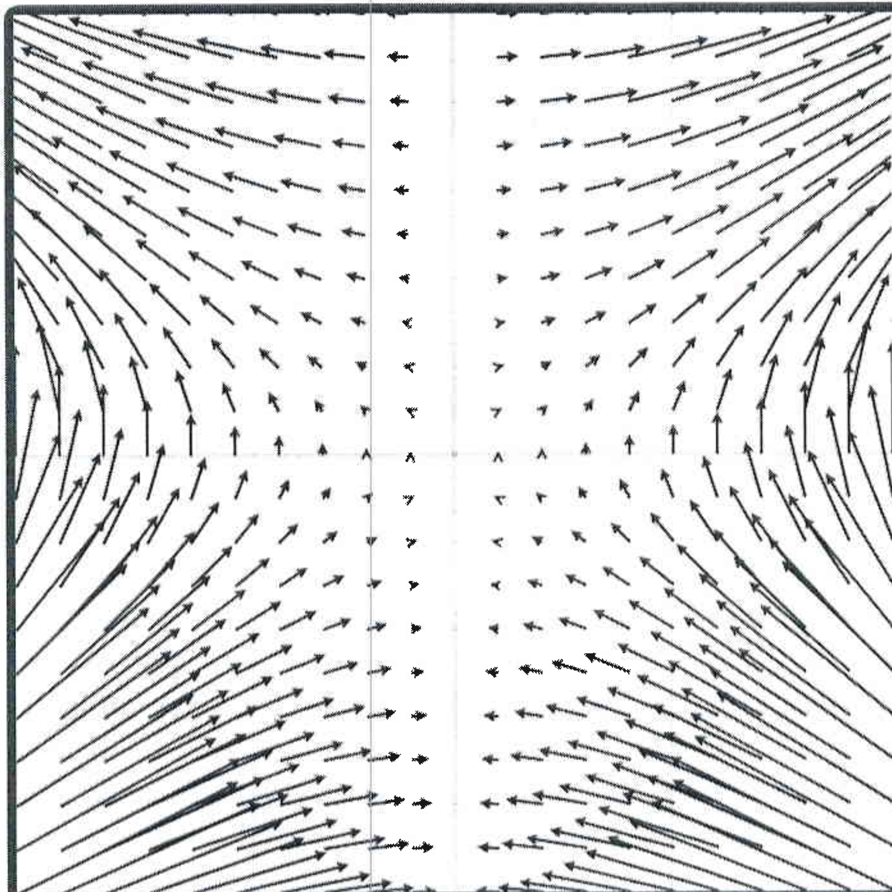
3. Find the value of the line integral $\int_C (x+2y)dx + (3x-y)dy$ along the curve $\vec{r}(t) = t\hat{\imath} + t^2\hat{\jmath}$. $[0,1]$

$dx = dt \quad dy = 2t\,dt$

$$\int_0^1 (t+2t^2)dt + (3t-t^2)2t\,dt$$

$$\int_0^1 t + 2t^2 + 6t^2 - 2t^3 \, dt = \int_0^1 t + 8t^2 - 2t^3 \, dt =$$

$$\tfrac{1}{2}t^2 + \tfrac{8}{3}t^3 - \tfrac{1}{2}t^4 \Big|_0^1 = \cancel{\tfrac{1}{2}} + \tfrac{8}{3} - \cancel{\tfrac{1}{2}} = \tfrac{8}{3}$$



2xyi+x^2j

Add Field

WINDOW SETTINGS

xmin = -5 xmax = 5

ymin = -5 ymax = 5

scale = 0.05

HELP LINK TO THIS GRAPH

Implicit Equations **Vector Fields**

VECTOR FIELDS