MTH 277, Quiz #7, Spring 2018 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Determine if the vector field $\vec{F}(x,y,z) = (x^2+y^2)\hat{\imath} + 2xy\hat{\jmath} + z\hat{k}$ is conservative.

$$\begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \\ \partial/\partial x & \partial/\partial y & \partial/\partial z \\ x^2+y^2 & 2xy & z \end{vmatrix} = (0-0)\hat{\imath} + (0-0)\hat{\jmath} + (2y-2y)\hat{k}$$

no, the field is conservative

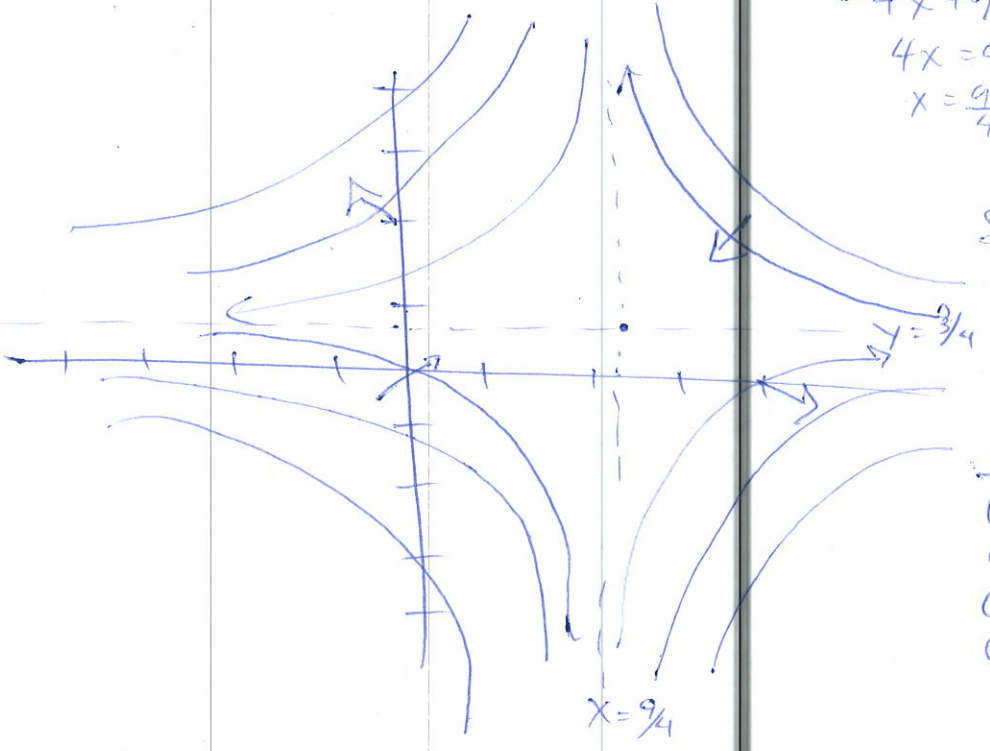
Since the curl is $\vec{0}$

2. Sketch the vector field of ∇f for $f(x,y) = 3x - 4xy + 9y$. Draw the nullclines and use that information to estimate the contour curves of the function.

$\nabla f = \langle 3-4y, -4x+9 \rangle$

$0 = 3-4y$
$4y = 3$
$y = \frac{3}{4}$

$-4x+9 = 0$
$4x = 9$
$x = \frac{9}{4}$



Saddle point

(x,y)	∇f
(0,0)	$\langle 3,9 \rangle$
(0,2)	$\langle -5,9 \rangle$
(4,0)	$\langle 3,-7 \rangle$
(4,2)	$\langle -5,-7 \rangle$