Your name:

Instructor (please circle):

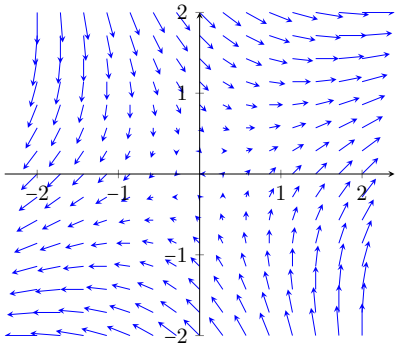
Craig Sutton Erik van Erp Jay Pantone Alex Barnett

Math 11 Fall 2015, Homework 7, due Wed Nov 4

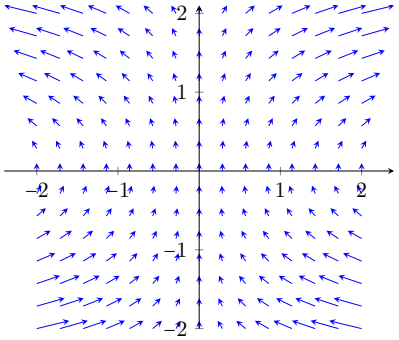
Please show your work. No credit is given for solutions without work or justification.

(1) (a) Match the vector field with with the plots.

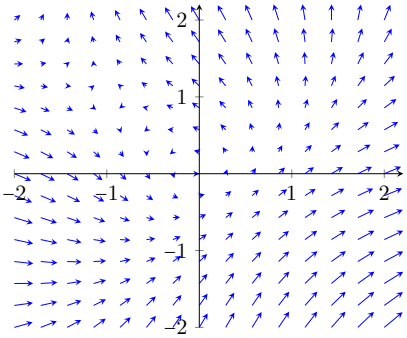
(I)



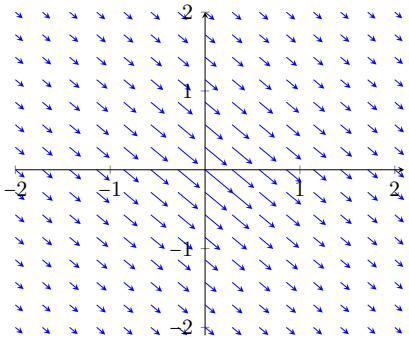
(II)



(III)



(IV)



$\langle x^2 - y,\ x + y^2 \rangle$ = _____

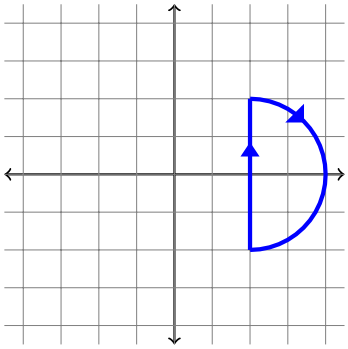
$\langle xy,\ 1 \rangle$ = _____

$\langle x + y,\ x - y \rangle$ = _____

$\left\langle \dfrac{1}{\sqrt{x^2+y^2}+1}, -\dfrac{1}{\sqrt{x^2+y^2}+1} \right\rangle$ = _____

(b) Find the curl and divergence of the vector field $\langle x^2 - y, x + y^2, 2x \rangle$.

(2) Let $\boldsymbol{F} = \langle 2y, -x \rangle$, and let $\mathcal{C}$ be the curve below. Find $\int_{\mathcal{C}} \boldsymbol{F} \cdot d\boldsymbol{r}$.



Hint: $\int \sin^2(t)dt = \frac{t}{2} - \frac{\sin(2t)}{4} + C$ and $\int \cos^2(t)dt = \frac{t}{2} + \frac{\sin(2t)}{4} + C$.

(3) (a) Find a potential function for $\boldsymbol{F}$ or prove that $\boldsymbol{F}$ is not conservative.

$$\boldsymbol{F} = \left\langle y\ln(z) + ye^{xy},\ x\ln(z) + xe^{xy},\ \frac{xy}{z} + 2z \right\rangle$$

(b) Find a potential function for $\boldsymbol{F}$ or prove that $\boldsymbol{F}$ is not conservative.

$$\boldsymbol{F} = \left\langle x^2\sin(y),\ \frac{x^3\cos(y)}{3} + 2yz,\ y \right\rangle$$