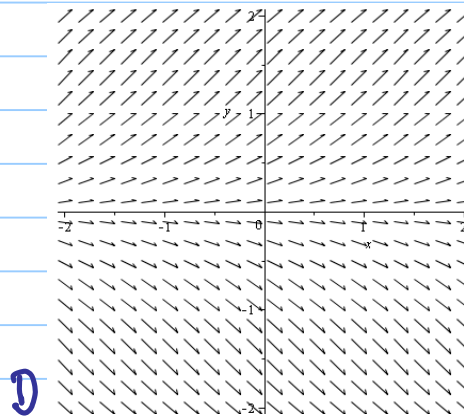
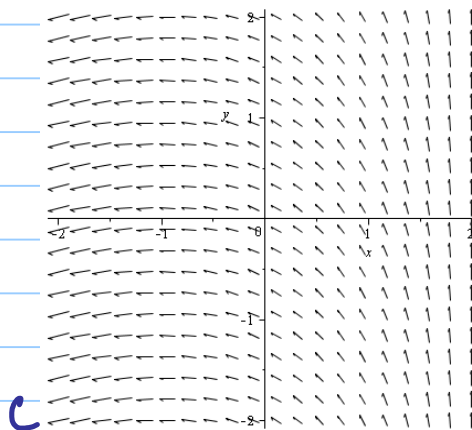
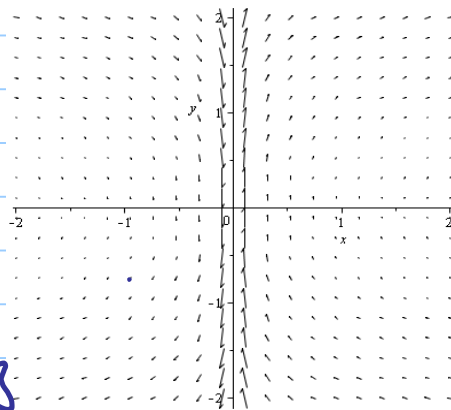
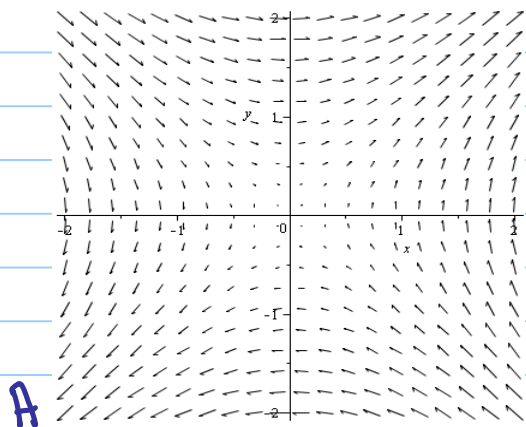


# Calc 3: Assignment 24

① Match the vector fields with the plots:

a)  $F(x,y) = \langle y, \frac{1}{x} \rangle$       b)  $F(x,y) = \langle x-2, x+1 \rangle$

c)  $F(x,y) = \langle y, x \rangle$       d)  $F(x,y) = \langle 1, \sin(y) \rangle$



② Use Maple to plot  $F(x,y) = \langle y^2 - 2xy, 3xy - 6x^2 \rangle$

③ Find the curl  $(F)$  and div  $(F)$  for:

a)  $\vec{F} = \langle xy^2, 0, -x^2y \rangle$

b)  $\vec{F} = \langle x^2yz, xy^2z, xy^2z \rangle$

c)  $\vec{F} = \langle e^x, e^{xy}, e^{xy^2} \rangle$

4) If  $f: \mathbb{R}^3 \rightarrow \mathbb{R}$  is a function and  $\vec{F}: \mathbb{R}^3 \rightarrow \mathbb{R}^3$  is a vector field, which expression is meaningful:

$$\text{curl}(f)$$

$$\text{grad}(f)$$

$$\text{div}(\vec{F})$$

$$\text{curl}(\text{grad}(f))$$

$$\text{grad}(\vec{F})$$

$$\text{grad}(\text{div}(\vec{F}))$$

$$\text{div}(\text{grad}(f))$$

$$\text{grad}(\text{div}(f))$$

$$\text{curl}(\text{curl}(\vec{F}))$$

$$\text{div}(\text{div}(\vec{F}))$$

$$(\text{grad}(f)) \times (\text{div}(\vec{F}))$$

$$\text{div}(\text{curl}(\text{grad}(f)))$$

5) Recall that if  $\vec{F} = \langle M, N \rangle$  is conservative, then  $\frac{\partial N}{\partial x} = \frac{\partial M}{\partial y}$ . Which vector fields are conservative:

a)  $\vec{F} = \langle 2x - 3y, -3x + 4y - 9 \rangle$

b)  $\vec{F} = \langle e^x \cos(y), e^x \sin(y) \rangle$

c)  $\vec{F} = \langle 3x^2 + 2y^2, 4xy + 3 \rangle$

③ For the vector fields in ① that are conservative, find the potential function