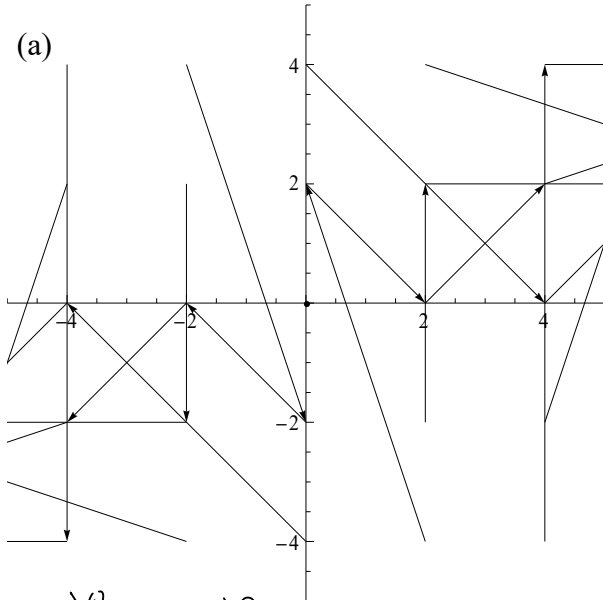


Vector Fields

Name: _____

For each vector field $\mathbf{F}(x, y)$, (a) calculate and draw the vector corresponding to each point on the grid, (b) determine whether the vector field is conservative, and (c) if the vector field is conservative, find the potential function $f(x, y)$.

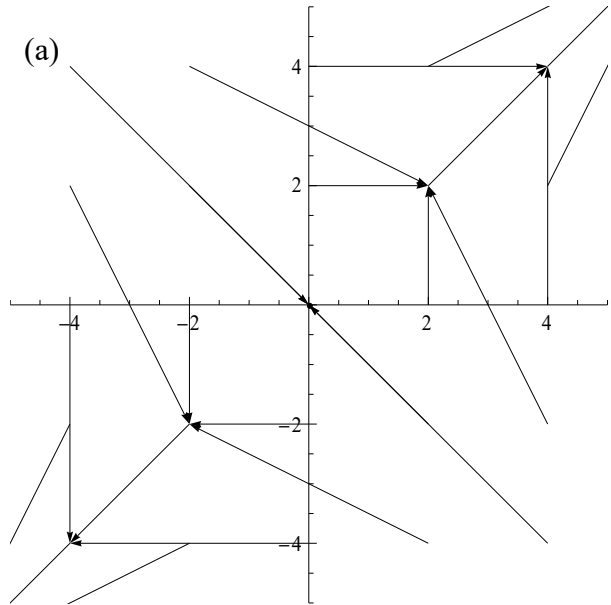
(1) $\mathbf{F}(x, y) = (x + y) \mathbf{i} + (x - y) \mathbf{j}$



(b) $\frac{\partial Q}{\partial x} = 1, \frac{\partial P}{\partial y} = 1$ Conservative

(c) $f(x, y) = xy + \frac{1}{2}x^2 - \frac{1}{2}y^2 + C$

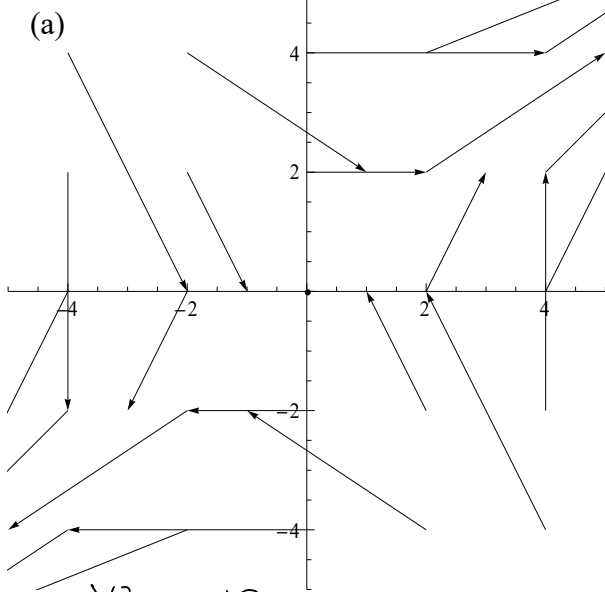
(2) $\mathbf{F}(x, y) = y \mathbf{i} + x \mathbf{j}$



(b) $\frac{\partial Q}{\partial x} = 1, \frac{\partial P}{\partial y} = 1$ Conservative

(c) $f(x, y) = xy + C$

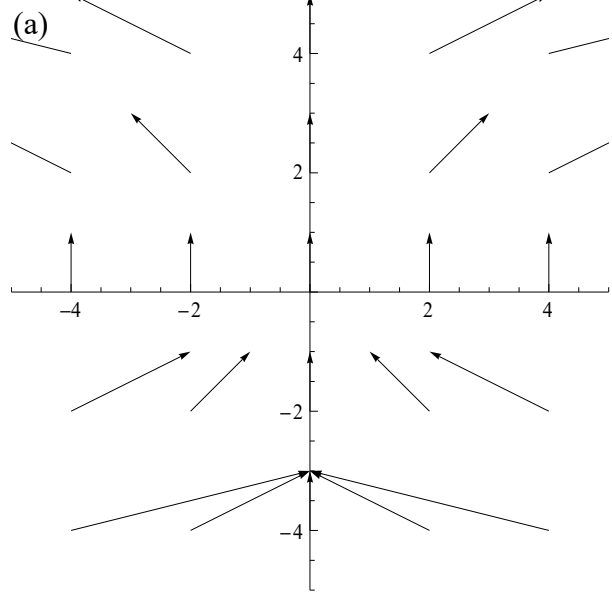
(3) $\mathbf{F}(x, y) = \left(\frac{x}{2} + y\right) \mathbf{i} + x \mathbf{j}$



(b) $\frac{\partial Q}{\partial x} = 1, \frac{\partial P}{\partial y} = 1$ conservative

(c) $f(x, y) = xy + \frac{1}{4}x^2 + C$

(4) $\mathbf{F}(x, y) = \frac{xy}{4} \mathbf{i} + 1 \mathbf{j}$



(b) $\frac{\partial Q}{\partial x} = 0, \frac{\partial P}{\partial y} = \frac{x}{4}$ Not conservative

(c) There is no potential function.