

5-1 Videos Guide

5-1a

Definition: (vector field)

- A vector field is a function whose set of inputs are points and whose outputs are vectors.

Exercise:

- Sketch the vector field \mathbf{F} .

$$\mathbf{F}(x, y) = \frac{1}{2}x \mathbf{i} + y \mathbf{j}$$

5-1b

- The gradient as a vector field

Definitions: (conservative vector field and potential function)

- If $\mathbf{F} = \nabla f$ for some function f , then \mathbf{F} is a conservative vector field with potential function f

Exercises:

- Find the gradient vector field of f .
- Find the gradient vector field ∇f of f and sketch it.

$$f(x, y, z) = x^2 y e^{y/z}$$
$$f(x, y) = \frac{1}{2}(x^2 - y^2)$$