20 11-06-2025

Note: We do NOT cover stream functions, source-free vector fields, or the Laplace equation (harmonic functions).

20.1 Section 6.1, Exercise 7

Describe the vector field by drawing some of its vectors:

$$F(x, y) = x\hat{i} - y\hat{j}$$

20.2 Section 6.3, Exercise 106

Determine if the vector field is conservative; if so, find its potential function.

$$F(x, y) = 2xy^3\hat{i} + 3y^2x^2\hat{j}$$

20.3 Section 6.3, Exercise 107

Determine if the vector field is conservative; if so, find its potential function.

$$(-y + e^x \sin y)\hat{i} + [(x + 2)e^x \cos y]\hat{j}$$

20.4 Math StackExchange problem

Determine if the vector field is conservative; if so, find its potential function.

$$F(x, y, z) = y\hat{i} + x\hat{j} + z^2\hat{k}$$