

1. Show that

$$F(x, y) = \langle \cos(y) - 2 + y^2 e^{xy^2}, \cos(y) - x \sin(y) + 3y^2 + 2xye^{xy^2} \rangle$$

is a conservative vector field by finding its potential function  $f(x, y)$ .

2. Show that

$$F(x, y) = \langle 2y + 2xy^2, 2x + 2y \rangle$$

is not a conservative vector field.