## **GRADIENT FIELDS**

Verify that each vector field below is a conservative or gradient vector field by showing that  $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$ , and then find a potential function z = f(x, y).

- 1.  $\vec{F} = x\hat{i} + y\hat{j}$
- 2.  $\vec{F} = y\hat{i} + x\hat{j}$
- 3.  $\vec{F} = \cos(x)\hat{i} + \sin(y)\hat{j}$
- 4.  $\vec{F} = (e^x + y^2)\hat{i} + (\cos y + 2xy)\hat{j}$
- 5.  $\vec{F} = (3xy^2 + 5)\hat{i} + (3 + 3x^2y)\hat{j}$