

## Exercise 31

Match the functions  $f$  with the plots of their gradient vector fields labeled I–IV. Give reasons for your choices.

$$f(x, y) = (x + y)^2$$

### Solution

Take the gradient of  $f$ .

$$\begin{aligned}\nabla f &= \left\langle \frac{\partial f}{\partial x}, \frac{\partial f}{\partial y} \right\rangle \\ &= \langle 2(x + y), 2(x + y) \rangle\end{aligned}$$

The vector is zero along the line  $y = -x$ . This matches with plot II.

