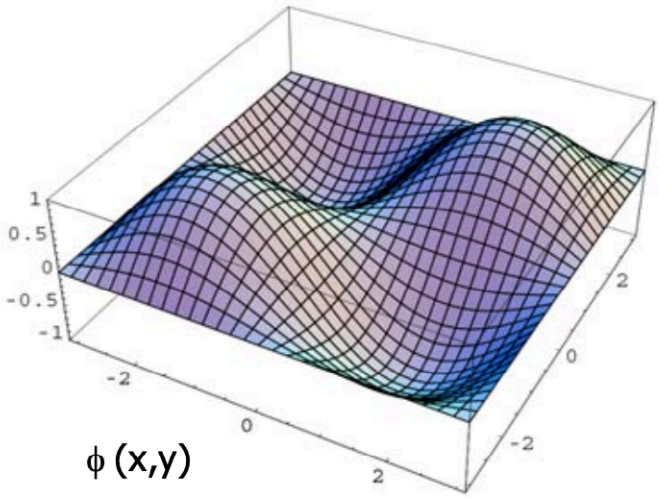
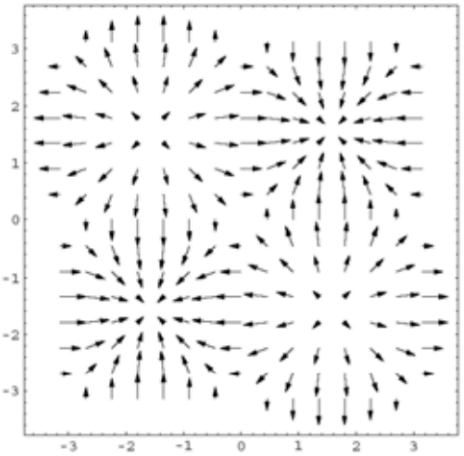
Visualization of gradients

Given the potential $\phi(x,y)=\sin(x)\sin(y)$, calculate its gradient.

$$\nabla\phi(x,y)=\cos(x)\sin(y)\hat{x}+\sin x\cos y\hat{y}$$



ϕ (x,y)



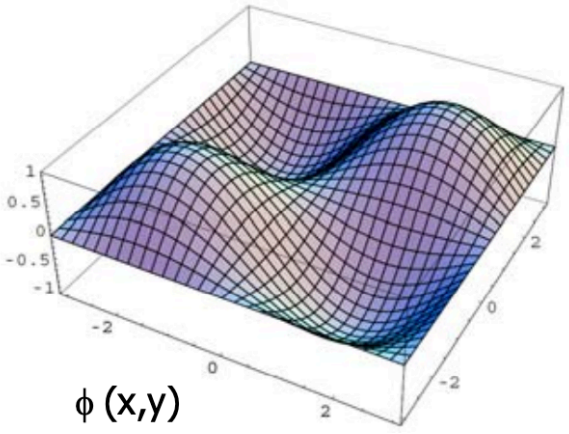
grad ϕ

The gradient always points uphill → E=-gradϕ points downhill

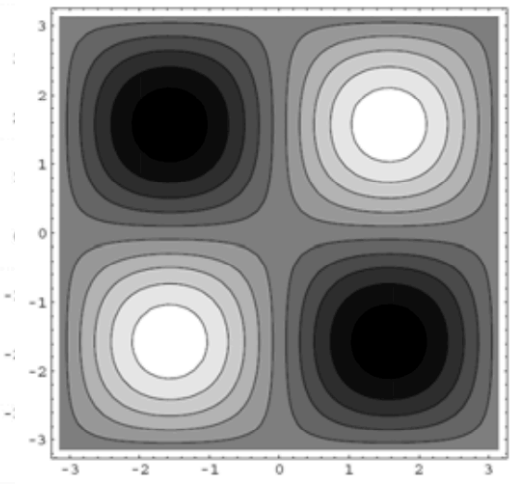
Visualization of gradients:

equipotential surfaces

Same potential $\phi(x,y)=\sin(x)\sin(y)$



ϕ (x,y)



NB: since equipotential lines are perpendicular to the gradient

→ equipotential lines are always perpendicular to E