

$$f(x,y) := \ln(\sqrt{x^2+y^2})$$

Done

$$dx f(x,y) := \frac{d}{dx}(f(x,y))$$

Done

$$dy f(x,y) := \frac{d}{dy}(f(x,y))$$

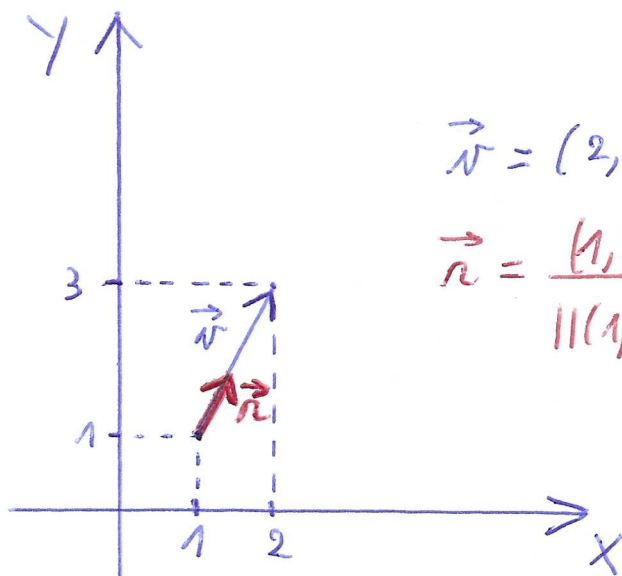
Done

$$dx f(1,1)$$

$$\frac{1}{2}$$

$$dy f(1,1)$$

$$\frac{1}{2}$$



$$\vec{r} = (2,3) - (1,1) = (1,2)$$

$$\vec{n} = \frac{(1,2)}{\|(1,2)\|} = \frac{(1,2)}{\sqrt{1^2+2^2}} = \frac{(1,2)}{\sqrt{5}} = \left(\frac{1}{\sqrt{5}}, \frac{2}{\sqrt{5}}\right)$$

$$D_{\vec{n}} f(1,1) = \nabla f(1,1) \cdot \vec{n} = \left(\frac{\partial f}{\partial x}(1,1), \frac{\partial f}{\partial y}(1,1)\right) \cdot \vec{n}$$

$$= \left(\frac{1}{2}, \frac{1}{2}\right) \cdot \left(\frac{1}{\sqrt{5}}, \frac{2}{\sqrt{5}}\right) = \frac{1}{2} \cdot \frac{1}{\sqrt{5}} + \frac{1}{2} \cdot \frac{2}{\sqrt{5}}$$

$$= \frac{1}{2\sqrt{5}} + \frac{2}{2\sqrt{5}} = \frac{3}{2\sqrt{5}}$$