

More about the gradient vector

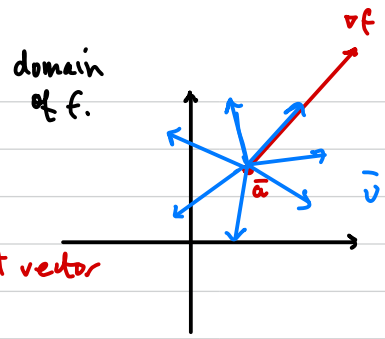
proof:

$$D_{\bar{v}} f(\bar{a}) = \nabla f(\bar{a}) \cdot \bar{v}$$

$$= |\nabla f(\bar{a})| |\bar{v}| \cos \theta$$

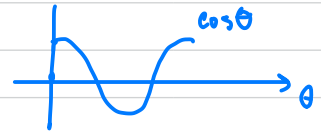
↑ $\bar{v}$ a unit vector

$$= |\nabla f(\bar{a})| \cos \theta$$



$\cos \theta$ max when $\theta = 0$, i.e. when

$\bar{v}$ points in direction $\nabla f(\bar{a})$.



Also, in this case, $\cos \theta = 1$ so

$$D_{\bar{v}} f(\bar{a}) = |\nabla f(\bar{a})|$$

↑ value of maximum rate of change.

Q: what if you want $D_{\bar{v}} f(\bar{a}) = 0$?

↳ take $\bar{v} \perp \nabla f(\bar{a})$