Note Title 8/5/2021

$$f(x+\eta d) - f(x) \approx \eta\, d^T \nabla f(x)$$

Want d s.t $\boxed{d^T \nabla f(x) < 0}$

dot product:

$a = [a_1, \cdots, a_d]$

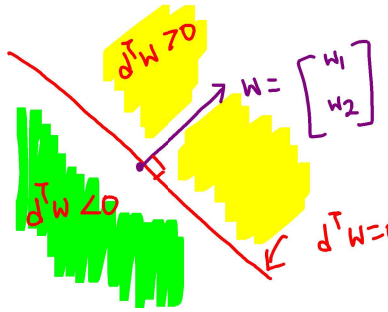
$b = [b_1, \cdots b_d]$

$a^T b = a_1 b_1 + a_2 b_2 + \cdots + a_d b_d$.

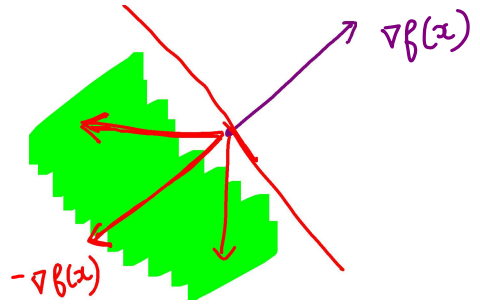
Note :- If $\boxed{d = -\nabla f(x)}$

$$(-\nabla f(x))^T (\nabla f(x)) = -\|\nabla f(x)\|_2^2 < 0$$

$$a^T a = a_1 a_1 + \cdots + a_d a_d = \sum_{i=1}^{d} a_i^2 > 0.$$



$d^T w = 0$?



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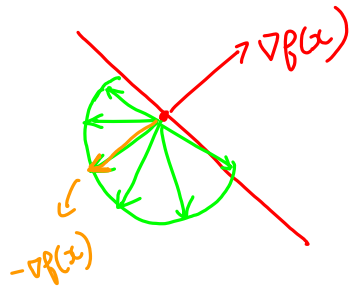
Note:- $-\nabla f(x)$ gives the "steepest" descent.

G.D is also called steepest descent.



$$\min_{x \in \mathbb{R}^d} f(x)$$

$$g(x) \leq 0$$

$g(x)$

$x_1^2 + x_2^2 - 10 \leq 0$