SUBGRADIENT

* GENERALISES GRADIENT TO CONVEX __BUT__
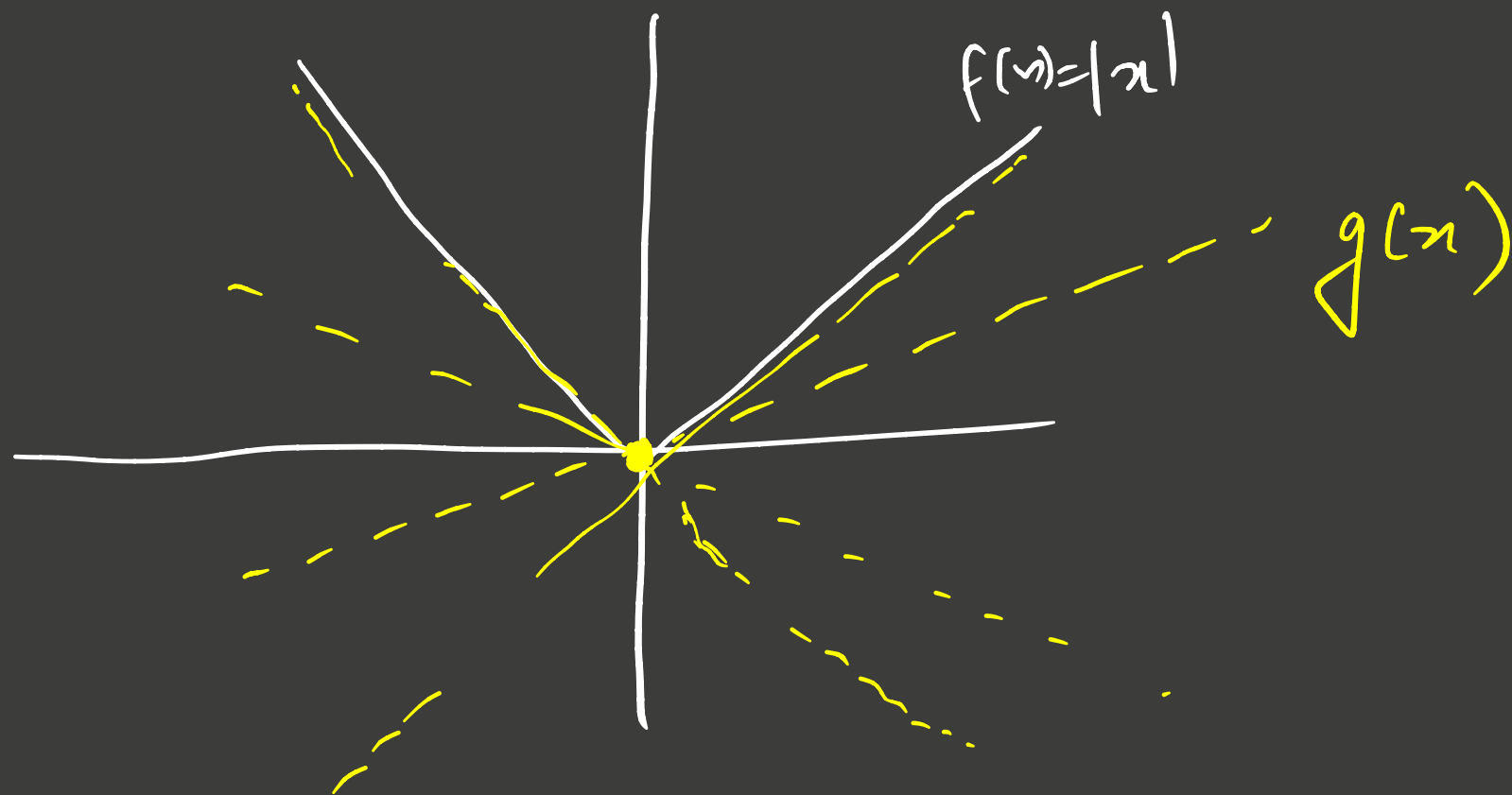NON-DIFFERENT
IABLE
PROBLEMS

$f(x)$

$g(x)$

x_0
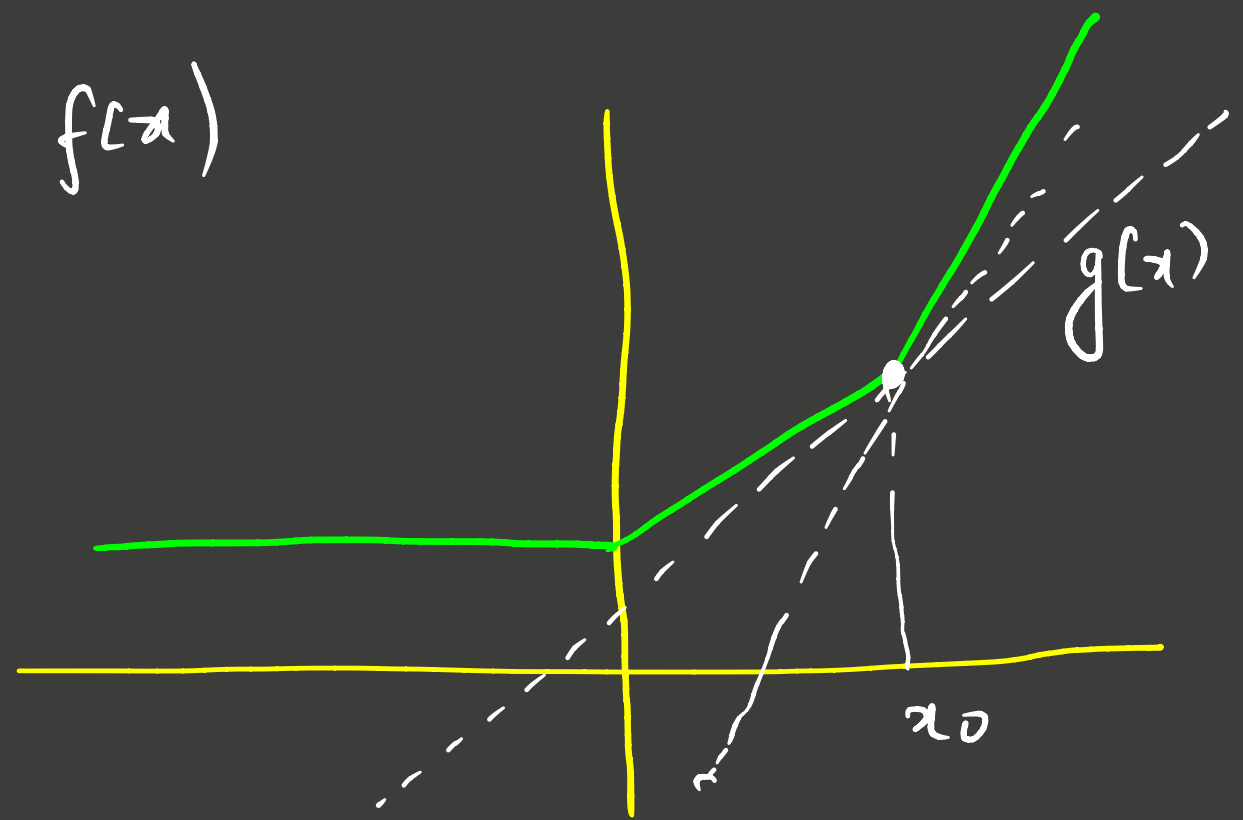
$\Rightarrow f(x)$ is CONVEX
BUT AT $x = x_0$ NON-DIFFERENTIABLE

$g(x)$ ① TOUCH $f(x)$ at $x = x_0$
② BELOW OR ON $f(x)$ $\forall x$

COMPUTE SLOPES OF
$g(x) \Rightarrow [a, b]$
SUBGRADIENT WRT
$f(x)$

SUBGRADIENT OF $|x|$

$f(x) = |x|$

$g(x)$

SLOPE of $g(x)$ Lies in $[-1, 1]$

$g_1(x) = -x$
$\Rightarrow$ touches $f(x)$ at $x = 0$
$\Rightarrow$ always on or below $f(x)$

$g_2(x) = x$
$\Rightarrow$ touches $f(x)$ at $x = 0$
$\Rightarrow$ always on or below $f(x)$