

QUIZ #3.

1) Give counterexample which shows that the following statement is FALSE

" Let f and g be diff'ble functions s.t. $f(x) \leq g(x)$ for all x then $f'(x) \leq g'(x)$ "

Consider $f(x) = \sin x$ and $g(x) = 1$, then $f(x) \leq g(x) \forall x$
 However $f'(x) = \cos x$ and $g'(x) = 0$ and $f'(x) \not\leq g'(x)$
 (e.g. $x=0 \quad \cos 0 = 1 \not\leq 0$)

2) Find tangent line of $x^3 + y^3 = 6xy$ at $(3,3)$

Firstly, check $(3,3)$ on curve or not. $3^3 + 3^3 = 6 \cdot 3 \cdot 3 \checkmark$
 so $(3,3)$ is on the curve.

$$\frac{d}{dx} (x^3 + y^3) = 6xy$$

$$3x^2 + 3y^2 \cdot y' = 6y + 6xy' \quad \textcircled{*}$$

put $(3,3)$

$$3 \cdot 3^2 + 3 \cdot 3^2 \cdot y' = 6 \cdot 3 + 6 \cdot 3 \cdot y'$$

$$\Rightarrow 9y' = -9 \Rightarrow y' = -1 \quad (\text{slope of tangent line at } (3,3))$$

$$\text{so t.l: } (y-3) = -1 \cdot (x-3)$$