AOD

way to find maxi. & min.

$(-1)^3 = -1+1=0$ x^2+1

$(1)^3+1 = 2$ $\quad x^2 \geq 0$

$-8+1=-7$ $\quad x^2+1 \geq 1$

$= 9$

① $|\sin 4x + 3|$

$\Rightarrow -1 \leq \sin 4x \leq 1$

$\Rightarrow -1+3 \leq \sin 4x + 3 \leq 1+3$

$\Rightarrow 2 \leq \sin 4x + 3 \leq 4$

$\Rightarrow |2| \leq |\sin 4x + 3| \leq |4|$

$\Rightarrow 2 \leq f(x) \leq 4$

max. → 4

min. → 2 Ans

② $f(x) = x^3 + 1$

Here the value of fun. $f(x)$ is totally depend on x^3.

and x^3 become +ive if x → +ive

& x^3 become −ive if x → −ive

So Here the fun. $f(x)$ doesn't have any max. or min. value.

AOD

Way to find maxi. & min.

i) first Derivative Test:-

a) identify fun. $f(x) = ?$

b) now diff. $f'(x) =$

c) find critical point → ?

d) draw no. line, locate critical point → analysis the sign.

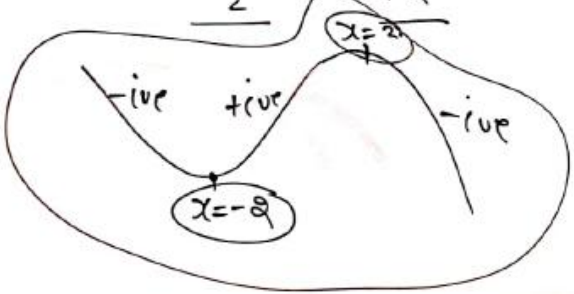
Ans: find points of max. & min. of $f(x) = -x^3 + 12x + 5$

Sol^n:- $f(x) = -x^3 + 12x + 5$

diff ⇒ $f'(x) = \underline{-3x^2 + 12}$

⇒ critical points → $f'(x) = 0 = -3x^2 + 12 = 0 \Rightarrow x^2 - 4 = 0 \Rightarrow x^2 = 4 \Rightarrow x = \pm 2$

⇒ $f'(x)$: $-\infty$ — $-$ive — -2 — $+$ive — $+2$ — $-$ive — ∞



Here it clear that $x = -2$ point of minima & $x = 2$ is point of max.

max value of fun. $= f(2) = -8 + 24 + 5 = \underline{21}$

min value of fun. $= f(-2) = 8 - 24 + 5 = -11$

AOD

way to find maxi. & min.

i) Second Derivative Test :- a) identify fun. $f(x) = ?$

b) now diff. $f'(x) =$

c) find critical point $\to ? \to$ let c_1, c_2, c_3

d) now Diff. $f'(x)$ again $\to f''(x)$

Case I :- $f''(c_1) < 0$; $f''(c_1) = -ive$:- then c_1 is point of maxima.

Case II :- $f''(c_2) > 0$; $f''(c_2) = +ive$:- Then c_2 is point of minima.

Case III :- $f''(c_3) = 0$; $\longrightarrow$ First derivative Test.

Q. $f(x) = x^2 \to f'(x) = 2x = 0 \Rightarrow \boxed{x=0} \to$ critical point.

$f''(x) = 2$

put $x=0$ in $\boxed{f''(0) = 2} > 0$ So :- $x=0$ is the point of min. Ans

& min. value of function $f(0) = 0$ Ans