AOD

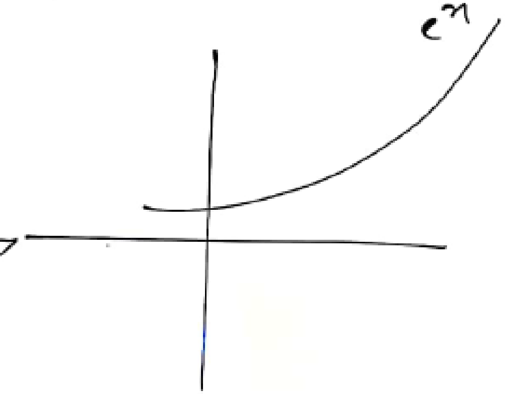
Ex:- Show that $f(x) = e^{2x}$ is strictly increasing on R.

Sol^n:- $\because f(x) = e^{2x}$

$\therefore f'(x) = e^{2x} \times 2 = 2e^{2x}$

$[f'(x) = 2e^{2x} > 0]$

So it is clear that $f(x) = e^{2x}$ is strictly $\uparrow$. Ans



Ex:- Show that the fun. $f(x) = \sin x$ is

a) increasing in $\boxed{(0, \pi/2)}$

b) decreasing in $(\pi/2, \pi)$

c) neither $\uparrow$ nor $\downarrow$ in $(0, \pi)$

Sol^n:- $\because f(x) = \sin x \Rightarrow \therefore [f'(x) = \cos x]$

a) in $(0, \frac{\pi}{2}) \Rightarrow f'(x) > 0$ i.e. $f(x) \to$ S. $\uparrow$. Ans//

b) in $(\pi/2, \pi) \Rightarrow f'(x) < 0$ i.e. $f(x) \to$ S. $\downarrow$.

c) from point a & b it is clear that in $(0, \pi) \to f(x)$ is neither $\uparrow$ nor $\downarrow$. H.P

$\frac{3\pi}{4} = f'(\frac{3\pi}{4}) = \cos(\frac{3\pi}{4})$

$\cos(\pi - \pi/4) = -\cos(\pi/4)$

$= -\frac{1}{\sqrt{2}}$

#AOD#

Ex:- Find the interval in which $f(x) = 2x^2 - 3x$ is

a) strictly ↑ b) strictly ↓. $(-\infty, 3/4)$

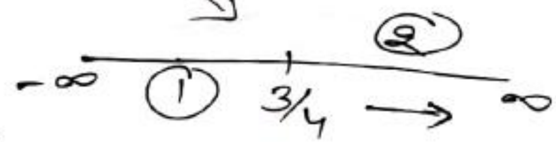
Sol^n:- $\because f(x) = 2x^2 - 3x$

$\therefore \boxed{f'(x) = 4x - 3} \Longrightarrow$ let $f'(x) = 0$

$4x - 3 = 0$

$4x = 3$

$[x = 3/4]$



→ Here on $f'(x) = 0$ we get $x = 3/4$

& on number line we get two interval $(-\infty, 3/4)$ & $(3/4, \infty)$.

Now in $(-\infty, 3/4) \rightarrow f'(x) < 0$

i.e. in $(-\infty, 3/4)$ $f(x) = 2x^2 - 3x$ is stri. ↓. Ans

$\Rightarrow$ in $(3/4, \infty) \Rightarrow f'(x) > 0$

i.e. $(3/4, \infty)$ $f(x$ is stri. ↑. Ans

$f'(x) = 4(1) - 3 = 1$

$f'(5/4) = 4 \times \frac{5}{4} - 3 = 2$

#AOD#

Ex:- $\boxed{\text{find intervals}}$ in which $f(x) = 2x^3 - 3x^2 - 36x + 7$ is

a) S.↑ b) S.↓.

Sol: $\because f(x) = 2x^3 - 3x^2 - 36x + 7$

$\therefore f'(x) = 6x^2 - 6x - 36$ ⇒ Now $f'(x) = 0 = 6x^2 - 6x - 36$

$0 = 6[x^2 - x - 6]$

$0 = 6[x^2 - 3x + 2x - 6]$

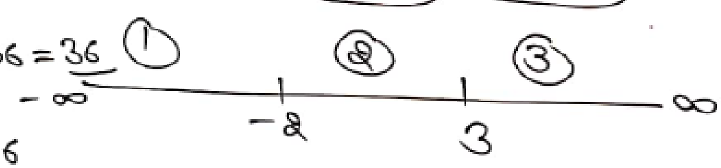
$0 = 6[x(x-3) + 2(x-3)]$

$0 = 6[(x-3)(x+2)]$

⇒ $\boxed{x=3}$, $\boxed{x=-2}$

Here on $f'(x) = 0$, we get $x = -2$ & $x = 3$ & on no. line we get 3 intervals.

$[(-\infty, -2)$ & $(-2, 3)$ & $(3, \infty)]$



i)

	interval	$f'(x)$	
↑ ✓	$(-\infty, -2)$	$f'(x) > 0$	→ $f'(x) = 6(-3)^2 - 6(-3) - 36 = 36$
↓	$(-2, 3)$	$f'(x) < 0$	→ $f'(x) = 0 - 0 - 36 = -36$
↑	$(3, \infty)$	$f'(x) > 0$	→ $f'(x) = 36$

So:- in $(-\infty, -2) \cup (3, \infty)$ $f(x)$ is stri.↑ & $(-2, 3)$ $f(x)$ is stri.↓. Ans