

**CLASS WORK**

1.	Show that the function f given by $f(x) = x^3 - 3x^2 + 4x$ , $x \in \mathbb{R}$ is strictly increasing on $\mathbb{R}$ .
2.	Prove that the function given by $f(x) = x^3 - 3x^2 + 3x - 100$ is increasing in $\mathbb{R}$ .
3.	Show that the function given by $f(x) = \sin x$ is (a) strictly increasing in $\left(0, \frac{\pi}{2}\right)$ (b) strictly decreasing in $\left(\frac{\pi}{2}, \pi\right)$ (c) neither increasing nor decreasing in $(0, \pi)$
4.	Prove that the function f given by $f(x) = \log \sin x$ is strictly increasing on $\left(0, \frac{\pi}{2}\right)$ and strictly decreasing on $\left(\frac{\pi}{2}, \pi\right)$
5.	Find the intervals in which the function f given by $f(x) = x^2 - 4x + 6$ is (a) strictly increasing (b) strictly decreasing
6.	Find the intervals in which the function f given by $f(x) = 2x^2 - 3x$ is (a) strictly increasing (b) strictly decreasing
7.	Find the intervals in which the function f given by $f(x) = 4x^3 - 6x^2 - 72x + 30$ is (a) strictly increasing (b) strictly decreasing.
8.	Find the intervals in which the function f given by $f(x) = 2x^3 - 3x^2 - 36x + 7$ is (a) strictly increasing (b) strictly decreasing
9.	Find the intervals in which the function f given by $f(x) = 5 + 36x + 3x^2 - 2x^3$ is (a) strictly increasing (b) strictly decreasing
10.	Find the intervals in which the $f(x) = \frac{3}{4}x^4 - \frac{4}{5}x^3 - 3x^2 + \frac{36}{5}x + 11$ is strictly increasing or decreasing:
11.	Find the intervals in which the following functions are strictly increasing or decreasing: i) $f(x) = \sin x + \cos x, 0 \leq x \leq 2\pi$ ii) $f(x) = \sin^4 x + \cos^4 x, 0 \leq x \leq \frac{\pi}{2}$
12.	Separate $\left[0, \frac{\pi}{2}\right]$ into sub-intervals in which $f(x) = \sin 3x$ is increasing and decreasing.
13.	Show that $y = \log(1+x) - \frac{2x}{2+x}, x > -1$ , is an increasing function of x throughout its domain.
14.	Prove that $y = \frac{4\sin \theta}{2 + \cos \theta} - \theta$ is an increasing function of $\theta$ in $\left[0, \frac{\pi}{2}\right]$

15.	Find the least value of $a$ such that the function $f$ given by $f(x) = x^2 + ax + 1$ is strictly increasing on $(1, 2)$ .
<b>HOME WORK</b>	
16.	Prove that the function $f$ given by $f(x) = x^2 - x + 1$ is neither strictly increasing nor strictly decreasing on $(-1, 1)$ .
17.	Prove that the function given by $f(x) = \cos x$ is (a) strictly decreasing in $(0, \pi)$ (b) strictly increasing in $(\pi, 2\pi)$ , and (c) neither increasing nor decreasing in $(0, 2\pi)$ .
18.	Show that the function given by $f(x) = 3x + 17$ is strictly increasing on $\mathbb{R}$ .
19.	Show that the function given by $f(x) = e^{2x}$ is strictly increasing on $\mathbb{R}$ .
20.	Find the intervals in which the following functions are strictly increasing or decreasing: (a) $x^2 + 2x - 5$ (b) $10 - 6x - 2x^2$ (c) $-2x^3 - 9x^2 - 12x + 1$ (d) $(x + 1)^3 (x - 3)^3$
21.	Find the intervals in which the following functions are strictly increasing or decreasing: i) $f(x) = 2x^3 - 3x^2 - 36x + 7$ ii) $f(x) = 5x^3 - 15x^2 - 120x + 3$
	Find the intervals in which the $f(x) = \frac{1}{4}x^4 + \frac{2}{3}x^3 - \frac{5}{2}x^2 - 6x + 7$ is strictly increasing or decreasing:
22.	Find the values of $x$ for which $y = [x(x - 2)]^2$ is an increasing function