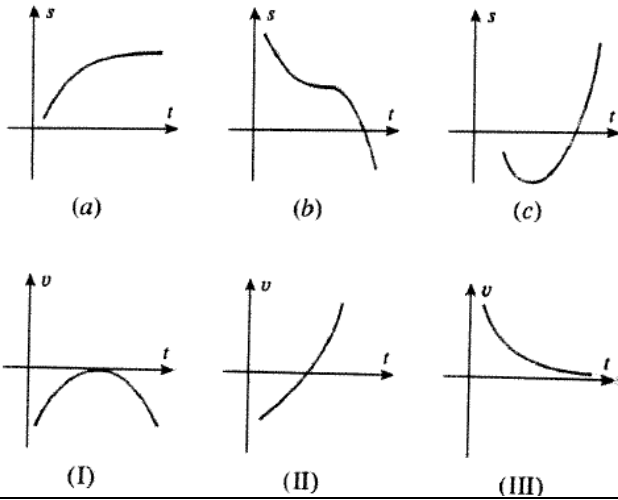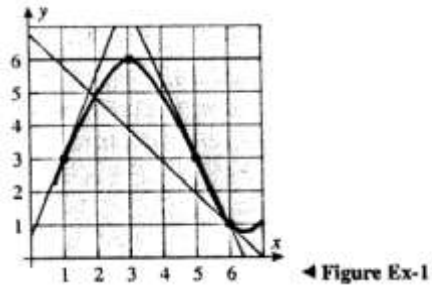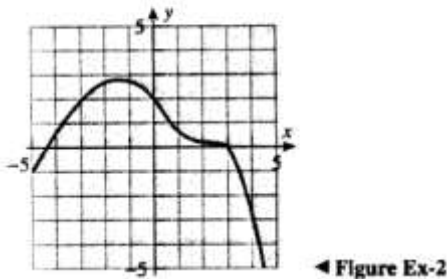1. For the graphs in the accompanying figure, match the position functions (a) to (c) with their corresponding velocity functions (I) to (III).

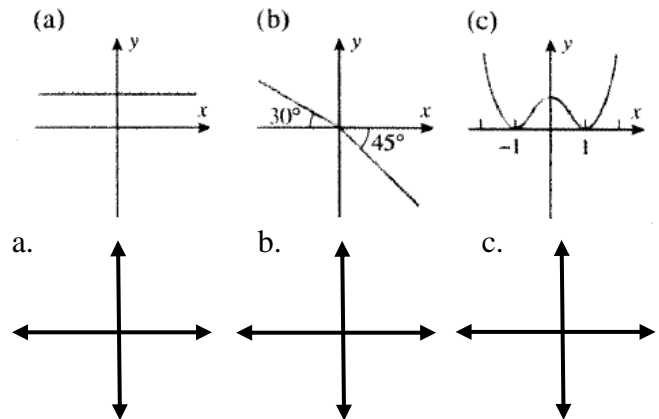(a)   (b)   (c)

(I)   (II)   (III)

2.

Use the graph of $y = f(x)$ in the accompanying figure to estimate the value of $f'(1)$, $f'(3)$, $f'(5)$, and $f'(6)$.

◄ Figure Ex-1

3.

For the function graphed in the accompanying figure, arrange the numbers 0, $f'(-3)$, $f'(0)$, $f'(2)$, and $f'(4)$ in increasing order.
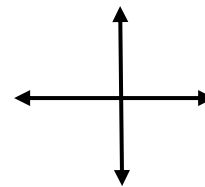
◄ Figure Ex-2

4. Sketch the graph of the derivative function for each function below.

(a)   (b)   (c)

30°   45°   -1   1

a.   b.   c.

5.

Given that the tangent line to the graph of $y = f(x)$ at the point (2,5) has the equation $y = 3x - 1$, find $f'(2)$.

For this function, what is the instantaneous rate of change of y with respect to x at $x = 2$?

6. Sketch the graph of a functions f for which $f(0) = -1$, $f'(0) = 0$,
    $f'(x) < 0$ if $x < 0$ and $f'(x) > 0$ if $x > 0$

7. Given that $f(3) = -1$ and $f'(3) = 5$.
Find an equation for the tangent line to the graph of $y = f(x)$ at $x = 3$.

8. Given that the tangent line to $y = f(x)$ at the point $(1, 2)$ passes through the point $(3, 5)$. Find $f'(1)$.

General Derivative	Derivative at a Point $x = a$
$f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$	$f'(a) = \lim\limits_{x \to a} \dfrac{f(x) - f(a)}{x - a}$ or $f'(a) = \lim\limits_{h \to 0} \dfrac{f(a+h) - f(a)}{h}$

9. If $f'(a) = \lim\limits_{h \to 0} \dfrac{\sqrt{9+h}-3}{h}$, what is $f(x)$? and what is a ?	10. If $f'(a) = \lim\limits_{h \to 0} \dfrac{(-1+h)^2 - 1}{h}$, what is $f(x)$? and what is a ?
11. $Calculate \ \dfrac{dy}{dt} \ , if \ y = \sqrt{t} \cot t$	12. Find the equation of the tangent line to the curve $y = 2 + 3\cos x$ at $(\pi, -1)$

Calculator is Permitted for the problem below.

13. A particle moves along a horizontal line so that its position at any time $t \geq 0$ is given by the function $s(t) = -t^3 + 8t^2 - 10t + 7$ where s is measured in meters and t is measured in seconds.	
a. Find the particle's instantaneous velocity at any time t.	b. Find the particle's acceleration at any time t.
c. When is the particle at rest? Justify your answer.	d. Find the displacement of the particle from $t = 0 \sec$ to $t = 5 \sec$. Show set up.
e. Find the total distance the particle traveled from $t = 0 \sec$ to $t = 5 \sec$. Show set up.	f. What is the particle's speed at 7 seconds? g. When is the particle's speed decreasing? Justify your answer.