DERIVATIVES

1. Find the slope of the tangent to the curve, $f(x) = x^2$ at the point on the curve where $x=x_o$.

3. The graph of function f has a verical tangent at the point (2,0) and horizontal tangents at the points (1,-1) and (3,1). For what values of x, $-2 < x < 4$, is f not differentiable?

Definition of Derivative:

$\frac{d}{dx} f(x) =$

DERIVATIVES RULES

If $f(x) = g(x)+h(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = g(x)*h(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \frac{g(x)}{h(x)}$, then $\frac{d}{dx}f(x)=$

If $f(x) = g(h(x))$, then $\frac{d}{dx}f(x)=$

If $f(x) = x^n$, then $\frac{d}{dx}f(x)=$

If $f(x) = a^x$, then $\frac{d}{dx}f(x)=$

If $f(x) = e^x$, then $\frac{d}{dx}f(x)=$

If $f(x) = \sin(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \cos(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \tan(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \sec(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \csc(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \cot(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \ln(x)$, then $\frac{d}{dx}f(x)=$

If $f(x) = \sin^{-1}(x)$, then $\frac{d}{dx}f(x)=$

*If $f(x) = \cos^{-1}(x)$, then $\frac{d}{dx}f(x)=$

*If $f(x) = \tan^{-1}(x)$, then $\frac{d}{dx}f(x)=$

*If $f(x) = \sec^{-1}(x)$, then $\frac{d}{dx}f(x)=$

*If $f(x) = \csc^{-1}(x)$, then $\frac{d}{dx}f(x)=$

*If $f(x) = \cot^{-1}(x)$, then $\frac{d}{dx}f(x)=$

THE DERIVATIVE

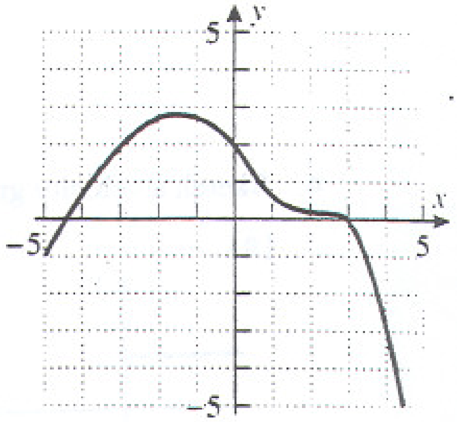
When is a graph increasing?

When is a graph decreasing?

When is a graph concave up?

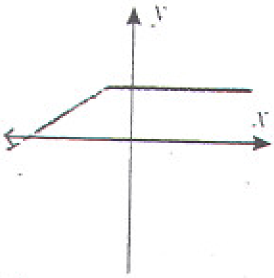
When is a graph concave down?

1. For the function k(x) graphed at the right, arrange the Following in decreasing order. O, $f'(-3)$, $f'(0)$, $f'(2)$, $f'(4)$.

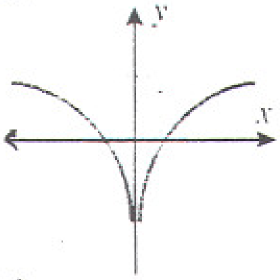


2. Match the graph of the function in (a)-(f) with the graph of its derivative in (A)-(F).

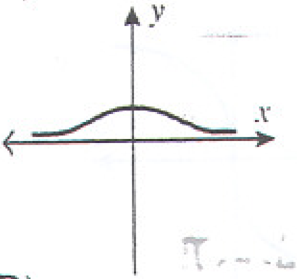
(a)



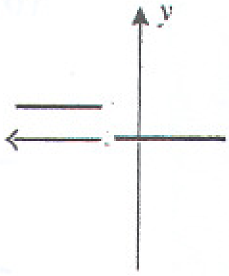
(d)



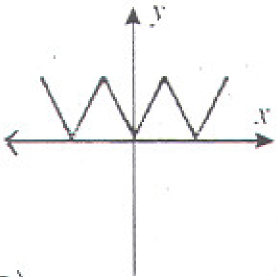
(A)



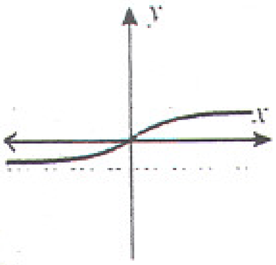
(D)



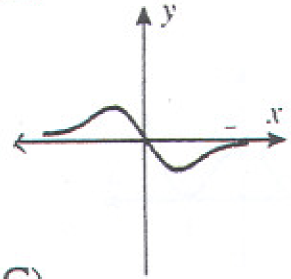
(b)



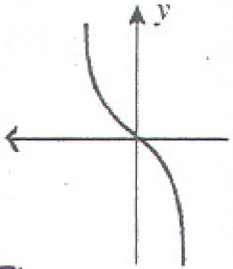
(e)



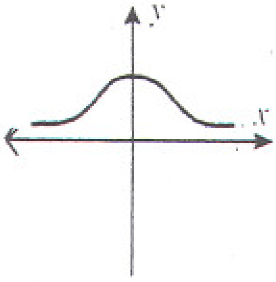
(B)



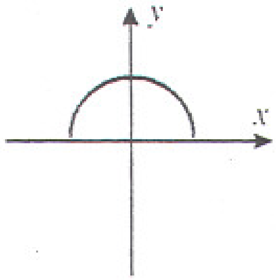
(E)



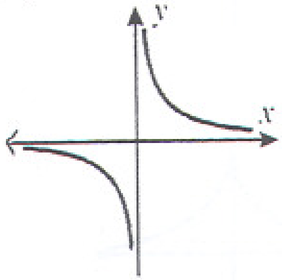
(c)



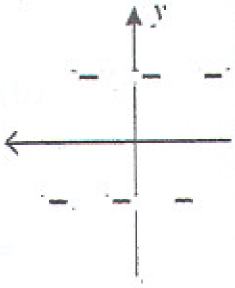
(f)



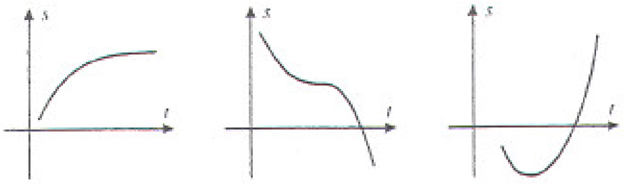
(C)



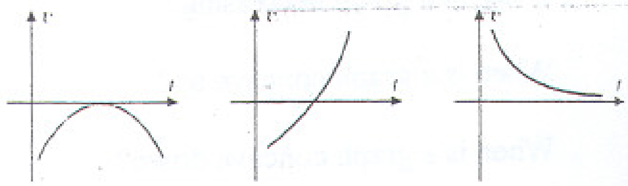
(F)



3. For the graphs in (a)-(c), match the position function s with the correct velocity graphs in (I)-(III).



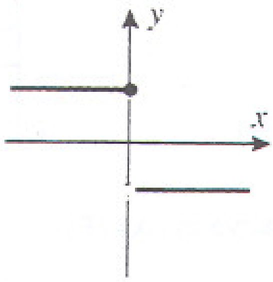
(a) (b) (c)



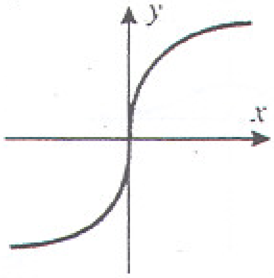
(I) (II) (III)

4. Sketch a velocity graph and an acceleration graph for each position graph sketched below.

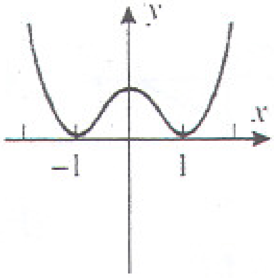
(a)



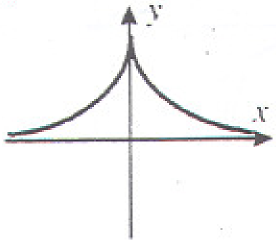
(b)



(c)



(d)



DERIVATIVE OF AN INVERSE

If f(x) and g(x) are inverses,and (x,y) is on the graph of f(x), then $\frac{d}{dx}f(x) = \frac{1}{\frac{d}{dx}g(y)}$.

Room temperature is 70˚F. A glass of lemonade is taken from the refrigerator set at 40˚F.

a) Use the values in the table to approximate the T'(120).
b) Explain the meaning of your answer.

minutes	x	0	30	60	90	120	150	180	210	240
temp. (˚F)	T(x)	40	47	52	56	59	61	63	65	66

I leave school right after the bell ending period 6. I write down my velocity by looking at my speedometer every five minutes until I arrive at home. \

a) Use this information in the table below, to find my average velocity.
b) Use the information in the table to approximate my velocity when I am halfway home.
c) Use the information in the table to approximate the distance to my house.
d) Use the information in the table to approximate my acceleration after 15 minutes.

DERIVATIVES

Find $\frac{dy}{dx}$.

1. $y = 5x^3 + 7x^5 - 3x - 9x$

2. $y = 5(\frac{7x^2 - 4}{(2x+1)})^{13}$

3. $y = 7\cos^5(3x)$

4. $y = 3 * 2^x * \ln 7\sqrt{x}$

5. $y = 9\tan^{-1}(\frac{4}{x^2})$

6. $y = \log_3 x$

7. $y^2 + \sin y = x^2$

8. $x^2 = \frac{(x+y)}{(x-y)}$

9. $\tan^3(xy^2) + y) = x$

10. $\frac{xy^3}{(1+\sec y)} = 1 + y^4$

11. Find the equation of the line tangent to the curve $y=\sqrt{x+3}$ at the point where x=6.

12. Use the linearization of $y=\sqrt{x+3}$ at x=6 to approximate the value of $y=\sqrt{8}$.

13. Find equations for two lines through the origin that are tangent to the curve $x^2-4x+y^2+3=0$.

14.At what point (s) is the tangent line to the curve $y^2=2x^3$ perpendicular to the line $4x-3y+1=0$.