2. $f(x) = 2x^{-1/3} + 3\cos x$

$f'(x) = -\frac{2}{3}x^{-4/3} - 3\sin x$

(B) $= \frac{-2}{3x^{4/3}} - 3\sin x$

3. $g(x) = [\sin(2x^3 + 3x)]^2$

$g'(x) = 2\sin(2x^3+3x) \cdot \cos(2x^3+3x) \cdot (6x^2+3)$

4. $y = x^2 \cdot \sin 2x$

$y' = 2x \cdot \sin 2x + x^2 \cdot \cos 2x \cdot 2$

$= 2x[\sin 2x + x\cos 2x]$

5. $f(x) = x \cdot (2x-3)^{1/2}$

$f'(x) = 1 \cdot \sqrt{2x-3} + x \cdot \frac{1}{2}(2x-3)^{-1/2} \cdot 2$

$= \frac{\sqrt{2x-3}}{\sqrt{2x-3}} \cdot \frac{\sqrt{2x-3}}{1} + \frac{x}{\sqrt{2x-3}}$

$= \frac{2x-3+x}{\sqrt{2x-3}} = \frac{3x-3}{\sqrt{2x-3}}$

11. $y = \dfrac{x^2-7x+2}{x-2}$, $x=4$

$$y' = \frac{(x-2)(2x-7)-(x^2-7x+2)(1)}{(x-2)^2}$$

$$= \frac{(2)(1)-(16-28+2)}{4} = \frac{2-(-10)}{4} = \frac{12}{4}$$

Instantaneous rate of change of a function $f(x)$ when $x = c$ is $f'(c)$ <-- slope of tangent line through a single point

Average rate of change of a function $f(x)$ on the interval $[a, b]$ is $\frac{f(b)-f(a)}{b-a}$ <-- slope of secant line through two points

Given a position function $s(t) = gt^2 + v_0t + s_0$,

Since velocity is the rate of change of position,

The instantaneous velocity at time $t = c$ is $s'(c)$

The average velocity on the interval $[a, b]$ is $\frac{s(b)-s(a)}{b-a}$

speed = |velocity|

speed: scalar

velocity: vector (has direction)

The Derivative

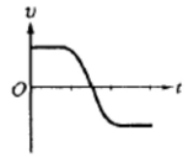
The slope of the tangent line to the graph of f at the point $(c, f(c))$ is given by:

$$m = \lim_{\Delta x \to 0} \frac{\Delta y}{\Delta x} = \lim_{\Delta x \to 0} \frac{f(c+\Delta x) - f(c)}{\Delta x}$$

The derivative of f at x is given by

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

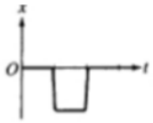
graph of f' →



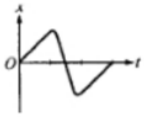
$v(t) = x'(t)$
= slope of position

The graph above shows velocity v versus time t for an object in linear motion. Which of the following is a possible graph of position x versus time t for this object?

(A) 

(B) 

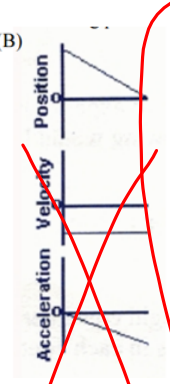
(C) 

(D) 

graph(s) of f

Which of the following sets of graphs below might be the corresponding graphs of position, velocity, and acceleration vs time for a moving particle?

(A) 

(B) 

(C) 

(D)