Math 1210 #13
Higher Order Derivatives

Higher Order Derivatives

Derivative	f' notation	y' notation	D_x notation	Leibniz notation
First				
Second				
Third				
Fourth				
Fifth				
n^{th}				

EX 1

Find $f'''(x)$ for $f(x) = (3 - 5x)^5$

EX 2

Find $\frac{dy}{dx}$ for $y = \sin\left(\frac{\pi}{x}\right)$.

EX 3

What is $D_x^5(3x^4 - 2x^3 + x^2 - 4)$?

EX 4

Find a formula for $D_x^n\left(\frac{1}{x}\right)$.

We know

$$v(t) = s'(t)$$
$$a(t) = v'(t) = s''(t)$$

EX 5

An object moves along a horizontal coordinate line according to $s(t) = t^3 - 6t^2$. s is the directed distance from the origin (in ft.) t is the time (in seconds.)

5a)

What are $v(t)$ and $a(t)$?

5b)

When is the object moving to the right?

5c)

When is it moving to the left?

5d)

When is its acceleration negative?

5e)

Draw a schematic diagram that shows the motion of the object.

$$f'(x), f''(x), f'''(x), f^{iv}(x)$$
$$\frac{dy}{dx}, \frac{d^2y}{dx^2}, \frac{d^3y}{dx^3}, \frac{d^4y}{dx^4}$$
$$y', y'', y''', y^{(4)}$$
$$D_x(y), D_x^2(y), D_x^3(y)\ D_x^4(y)$$

Note that $\frac{d^2y}{dx^2} = \frac{d}{dx}\left(\frac{dy}{dx}\right)$ or $\frac{dy'}{dx}$