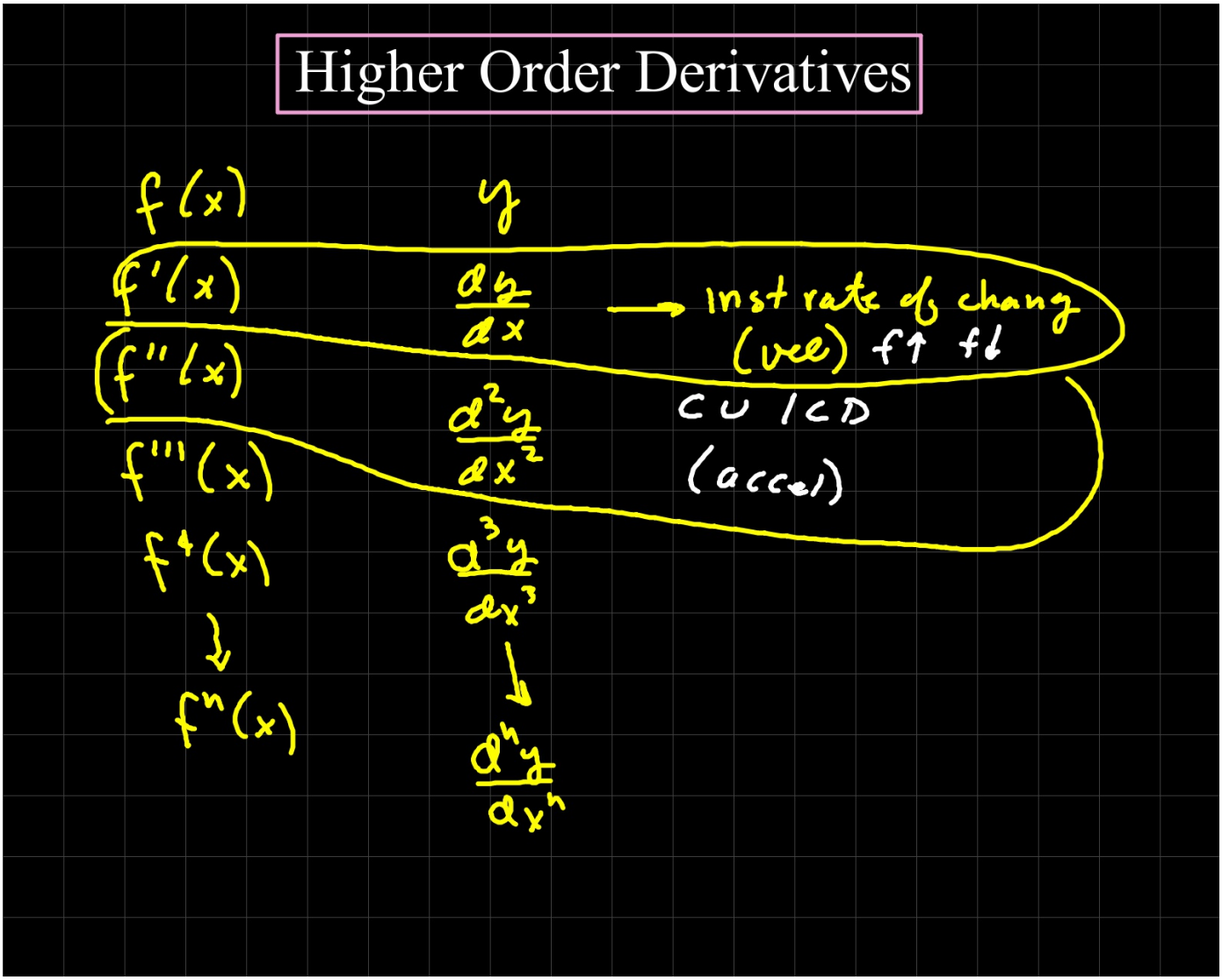
Higher Order Derivatives



$f(x) = x^3 + 3x^2 - 9x + 7$

$f'(x) = 3x^2 + 6x - 4$

$f''(x) = 6x + 6$

$f'''(x) = 6$

$f^4(x) = 0$

Polynomial func.

$(n+1)$th deriv $= 0$.

$f(x) = \sec x$

$f'(x) = \sec x \tan x$

$f''(x) = \sec x \sec^2 x + \tan x \sec x \tan x$

$$f(x) = \frac{3x-2}{2x+1}$$

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

$$= \frac{6x+3-6x+4}{(2x+1)^2}$$

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

$$= 7(2x+1)^{-2}$$

$$f''(x) = -14(2x+1)^{-3}(2) = -\frac{28}{(2x+1)^3}$$

$f(x) = \sin x$

$f'(x) = \cos x$

$f''(x) = -\sin x$

$f'''(x) = -\cos x$

$f^{4}(x) = \sin x$

Given $f(x) = \sin x$

find $f^{333}(x)$

$$4\overline{)333} \quad 83 \text{ R } 1$$

$f^{333}(x) = f'(x)$

$= \cos x.$

$f(x) = \cos x$

$f'(x) = -\sin x$

$f''(x) = -\cos x$

$f'''(x) = \sin x$

$f^4(x) = \cos x$

Given $f(x) = \cos x$, find $f^{515}(x)$.

$$4\overline{)515} \quad 128 \text{ R } 3$$

$f^{515}(x) = f'''(x)$.

$f'(x) = -\sin x$

$f''(x) = -\cos x$

$f'''(x) = \sin x$

$\therefore f^{515}(x) = \sin x$