Dt: 6/04/2021

→ Integration:

$f(x) = 2x^2 \longrightarrow \boxed{\quad} \longrightarrow g(x)$ (box: d/dx)

$4x^3 + 5$

$5 : x^3$

$\frac{d}{dx} \rightarrow '$ $\quad f' = \frac{d}{dx} f$

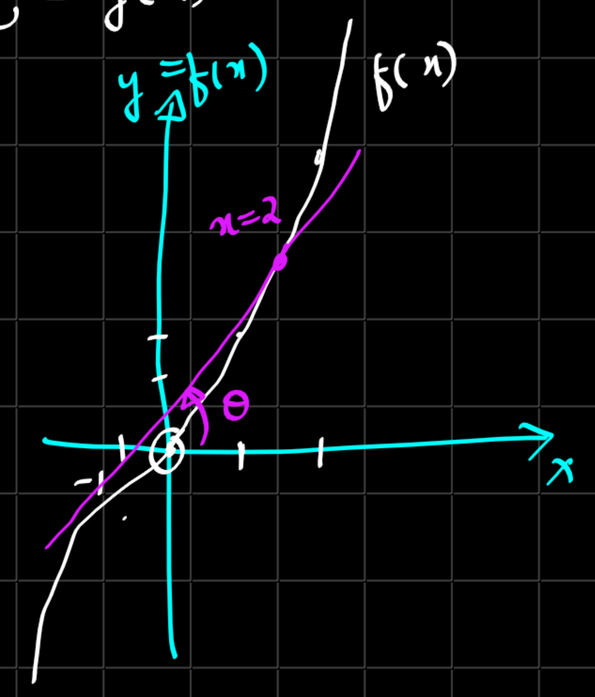
$f(x) = 2x^3 \longrightarrow \frac{d}{dx} f(x) \rightarrow \frac{d}{dx}(2x^3) = 2\frac{d}{dx}x^3 = \underbrace{6x^2} = g(x)$

$f(x) = 2x^3 \longrightarrow f'(x) \longrightarrow 6x^2 = g(x)$

$\vec{F}$

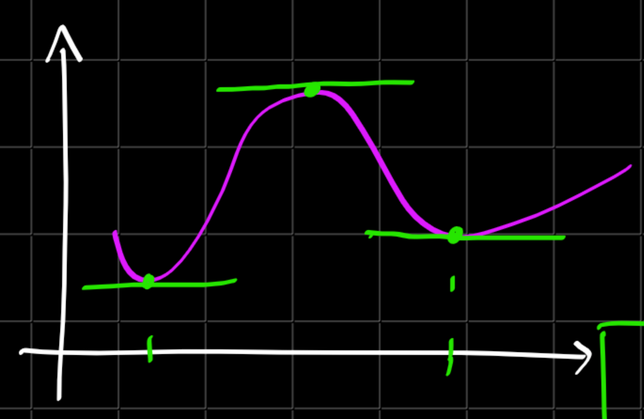
→ $\vec{F} = m\vec{a}$

$\vec{F} = m\frac{d^2\vec{x}}{dt^2} = m\frac{d\vec{v}}{dt}$ $\quad \vec{x}(t) =$ $\quad \vec{v}(t) =$

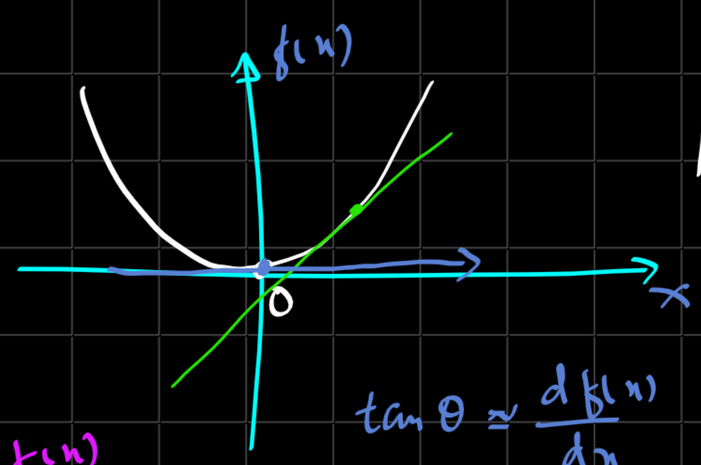


$\tan\theta =$

$f(x) = x^2$



$\frac{df}{dx} = 0$



$\tan\theta \simeq \frac{df(x)}{dx}$ $\quad \frac{f(\theta)}{d\theta}$

$\Rightarrow 0 = \frac{df}{dx}$

$f(x) = (x^2-1)^2$

$f'(x) = 2(x^2-1)2x = 4x(x^2-1) = 0$

$\Rightarrow \boxed{x = 0}$; $x^2 - 1 = 0 \Rightarrow x^2 = 1 \Rightarrow \boxed{x = \pm 1}$

$f'(x) = 4x(x^2-1) = g(x)$

$\Rightarrow f''(x) = 4(x^2-1) + 8x^2 =$

$f''(x)\big|_{x=0} = -4 < 0 \rightarrow$ maximum.

$f''(x)\big|_{x=1} = 8 > 0 \rightarrow$ minima

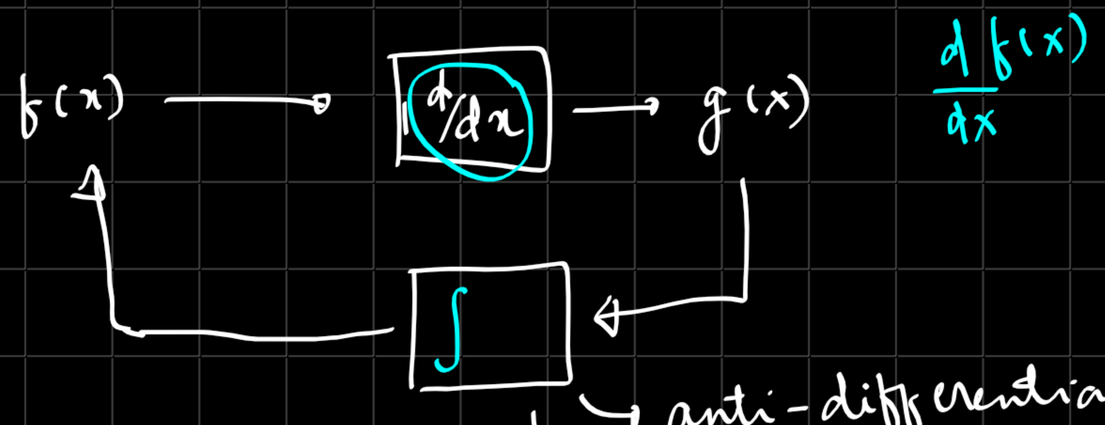
$f''(x)\big|_{x=-1} = +8 > 0 \rightarrow$ minima

$f(x=0) = 1$

$f(x=1) = 0$

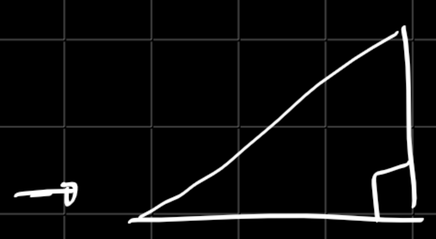
$f(x=-1) = 0$

→



$\frac{df(x)}{dx}$

→



$A = \frac{1}{2} b \times h$

→ $g(x)$ → $\int g(x)\,dx = f(x)$

Integrand — Integral

$f(x) = 2x^2 \rightarrow f'(x) = 4x = g(x)$

$\int g(x)\,dx = 2x^2$

$\Rightarrow \int 4x\,dx$

$= 4\int x\,dx = 2x^2$

$\frac{x^2}{2}$

① $\int x\,dx = \frac{x^2}{2}$

② $\int x^2\,dx = \frac{x^3}{3} + C$

③ $\boxed{\int g(x)\,dx = f(x) + C}$

~~$\frac{d}{dx}\,k = 0$~~

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

H.W.

$\int \underbrace{x^n}_{g(x)}\,dx = \;\_\_\_\_$

$f(x) = x^{n+1} \rightarrow f'(x) = g(x)$

→ $f(x) = 4x^3 + 1 \longrightarrow \frac{d}{dx}f(x) = 12x^2 = g(x)$

$\int \underbrace{g(x)\,dx} = 4x^3 + 1$

$\Rightarrow 12\int x^2\,dx = 4x^3 + 1$

$\frac{x^3}{3} + \frac{1}{12}$

$f(x) = 4x^3 + 5$

$f(x) = 4x^3 \rightarrow \frac{d}{dx}f(x) = 12x^2 = g(x)$

$\int g(x)\,dx = 4x^3$

$\Rightarrow 12\int x^2\,dx = 4x^3$

$\frac{x^3}{3} + C = 0$

$\int x^2\,dx = \frac{x^3}{3} + \frac{5}{12}$