7. $f(x) = (4x^3 - x)^{10}$

$f = x^{10}$

$g = 4x^3 - x$ $\qquad 10(4x^3-x)^9 \cdot (12x^2-1)$

$f' = 10x^9$

$g' = 12x^2 - 1$

11. $f(x) = (\ln x + x^2)^3$

$f(x) = x^3 \qquad f' = 3x^2$

$g(x) = \ln x + x^2 \qquad g' = \frac{1}{x} + 2x$

$3(\ln x + x^2)^2 \left(\frac{1}{x} + 2x\right)$

33. $f(x) = [\sin(3x+4)][\cos(5-2x)]$

$\sin(3x+4) \cdot (-\sin(5-2x) \cdot -2)$

$+ \cos(5-2x) \cdot 3\cos(3x+4)$

7. Find the maximal area of a right triangle with hypotenuse of length 1.

$A = \frac{1}{2}ab$

$a^2 + b^2 = 1 \qquad (1-b^2)^{\frac{1}{2}} = a$

$\frac{d}{dx} \quad \frac{1}{2}(1-b^2)^{\frac{1}{2}} \cdot b = A = \frac{1}{2}\left[-b \cdot (1-b^2)^{\frac{-1}{2}} b + (1-b^2)^{\frac{1}{2}}\right]$

$\frac{1}{2}\left[\frac{1}{2}(1-b^2)^{\frac{-1}{2}} \cdot 2b \cdot b + (1-b^2)^{\frac{1}{2}}\right]$

$$\frac{1}{2}\left[-b(1-b^2)^{-\frac{1}{2}}\cdot b+(1-b^2)^{\frac{1}{2}}\right]$$

$$\frac{1}{2}(1-b^2)^{-\frac{1}{2}}\left[-b^2+(1-b^2)\right]$$

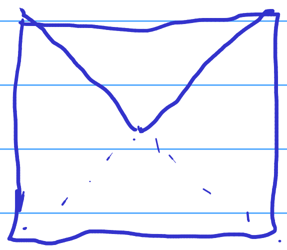
$$(1-b^2)^{-\frac{1}{2}}\left[-\frac{b^2}{2}+\frac{1}{2}-\frac{b^2}{2}\right]$$

$$(1-b^2)^{-\frac{1}{2}}\left[\frac{1}{2}-b^2\right]=0$$

$b=\pm 1$ $\qquad$ $b=\pm\frac{\sqrt{2}}{2}$

$b=1$ $\qquad$ $b=\frac{\sqrt{2}}{2}$

$\frac{1}{2}(1-b^2)^{\frac{1}{2}}\cdot b=A$ $\qquad$ $\frac{1}{2}\left(1-\frac{1}{2}\right)^{\frac{1}{2}}\cdot\frac{\sqrt{2}}{2}=A$



$$\frac{1}{2}\cdot\frac{\sqrt{2}}{2}\cdot\frac{\sqrt{2}}{2}=A$$

$$\frac{1}{4}=A$$

$\frac{d}{dx} x^2 = 2x$ $\quad \frac{d}{dx} x^2 - 10 = 2x$

$\int 2x \, dx = x^2 + C$

$\int x^3 \, dx$

derivative of what $= x^3$

$\frac{1}{4} x^4 + C \quad \frac{1}{4} 4 x^3 = x^3$

$\frac{d}{dx} x^n = n x^{n-1}$

$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$

$\int \left(\frac{d}{dx} 5x^7 + 2 \right) dx \qquad 5x^7 + 2 + C_2$

$\int 35x^6 \, dx$

$5x^7 + C_1$

$\int 9x^2 + 6x + \cos x \, dx$

$3x^3 + 3x^2 + \sin x + C$

$\frac{d}{dx} 2\sin^2 x = 4(\sin x) \cdot \cos x$

$\frac{d}{dx}(-2\cos^2 x) = -2(2)(\cos(x)) \cdot (-\sin x)$

$4 \cos x \sin x$

$acc = -9.81 \frac{m}{s^2}$

$vel = \int -9.81 \cdot dt \qquad -9.81t + C \quad \frac{m}{s}$

at $t=0$ $\quad C \qquad V_0$

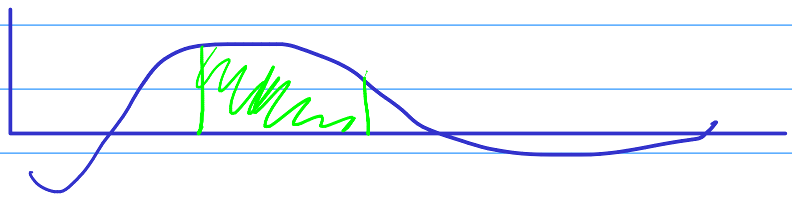
$pos = \int -9.81t + C \, dt$

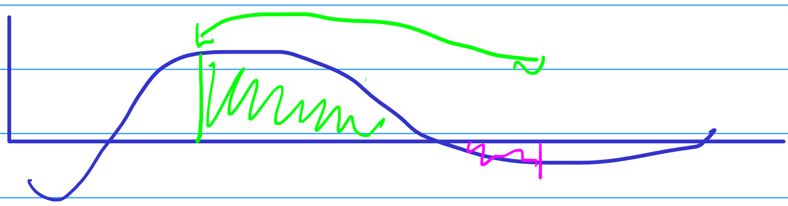
$\frac{-9.81t^2}{2} + Ct + C_2 \qquad m$

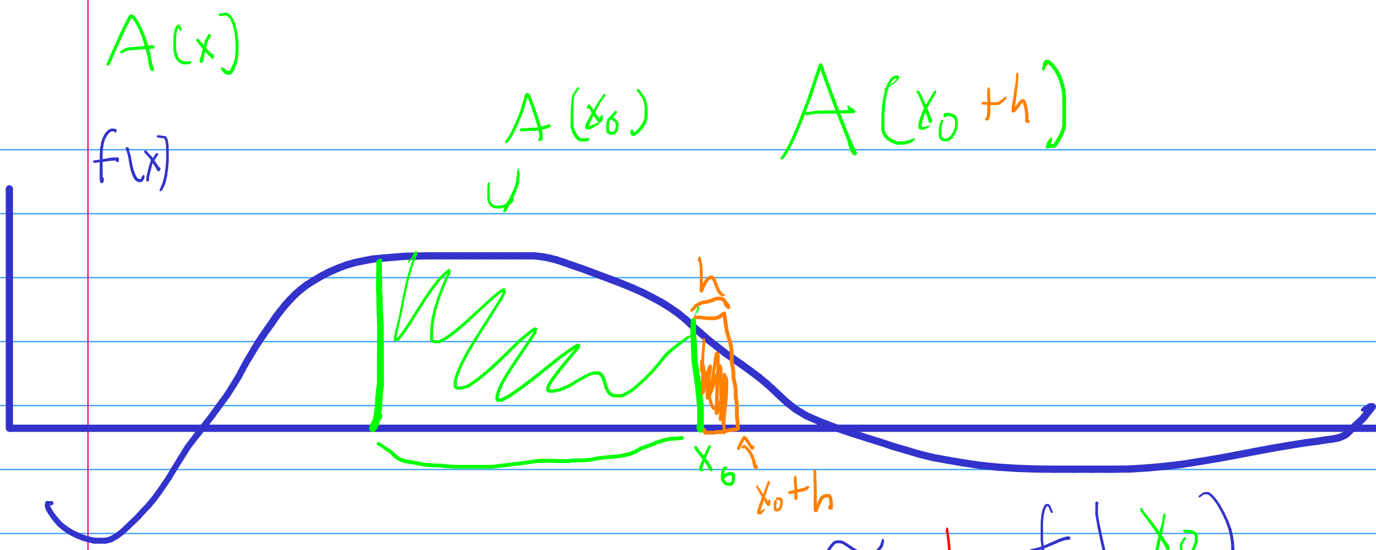
S_0

$\frac{-9.81t^2}{2} + V_0 t + S_0$

definite integrals







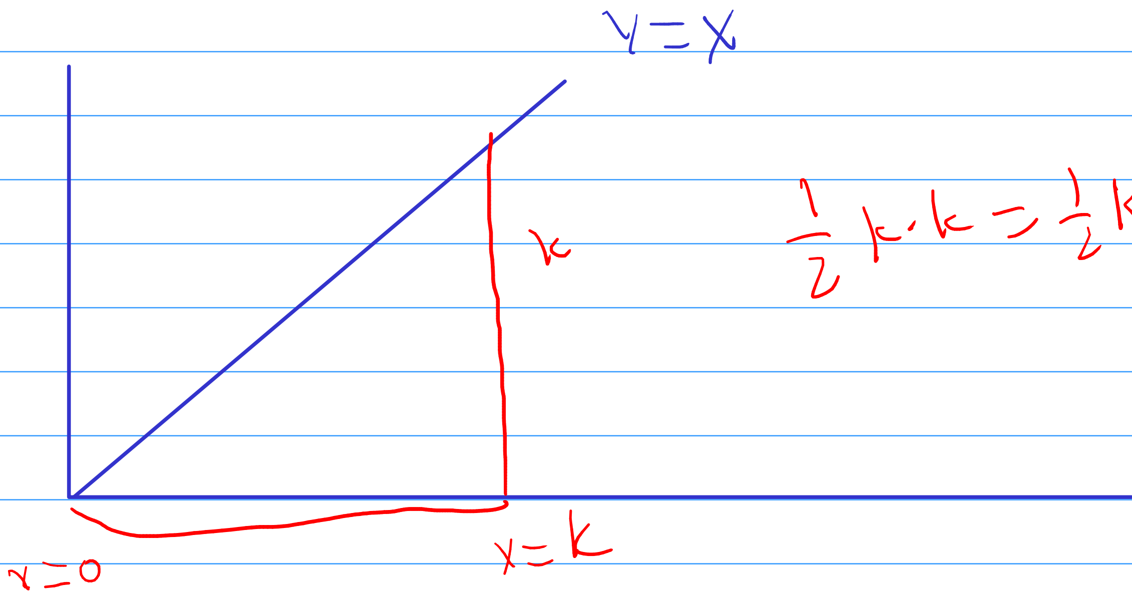
$$A(x_0+h) - A(x_0) \approx h\, f(x_0)$$

$$\lim_{h \to 0} A(x_0+h) - A(x_0) = h\, f(x_0)$$

$$\lim_{h \to 0} \frac{A(x_0+h) - A(x_0)}{h} = f(x_0)$$

FTC

Fundamental Theorem of Calculus!



$$\frac{1}{2} k \cdot k = \frac{1}{2} k^2$$