* Integrations

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

2- $\int \cos x \, dx = \sin x + C$

3- $\int \sin x \, dx = -\cos x + C$

4- $\int \sec^2 x \, dx = \tan x + C$

5- $\int \csc^2 x \, dx = -\cot x + C$

6- $\int \sec x \tan x \, dx = \sec x + C$

7- $\int \csc x \cot x \, dx = -\csc x + C$

$\int \sin(ax+b)\, dx = \frac{1}{a} * -\cos(ax+b) + C$

$\int \cos(ax+b)\, dx = \frac{1}{a} * \sin(ax+b) + C$

* definite Integral Proprieties

1- $\int_a^a f(x)\, dx = 0$

2- $\int_a^b f(x)\, dx = -\int_b^a f(x)\, dx$

3- $\int_a^b N f(x)\, dx = N \int_a^b f(x)\, dx$

4- $\int_a^b f(x) \pm g(x)\, dx = \int_a^b f(x)\, dx \pm \int_a^b g(x)\, dx$

5- $\int_a^b f(x)\, dx = \int_a^c f(x)\, dx + \int_c^b f(x)\, dx$

• التكامل بالتعويض :-

* الصورة العامة * الصورة التالية

$\int f(x) \times g(x)\,dx$ ؟

ومتى نأخذ الصورة التالية :-

$\int (g(x))^{n} \times$ مشتقة القوس dx ؟

⚠ الخطوات :-

نفرض ص = القوس

$$dx = \frac{dy}{\text{مشتقة القوس}}$$

In English

$$\int (f(x))^{n} f'(x)\,dx$$

Steps:-

Lets say: $u = f(x)$

$$dx = \frac{du}{f'(x)}$$

An Example:-

$$\int x\,(x^2+3)^{10}\,dx$$

$$\Rightarrow u = x^2+3$$

$$du = 2x\,dx$$

$$\frac{du}{2} = x\,dx$$

$$= \int (u)^{10} \frac{du}{2}$$

$$= \frac{1}{2}\frac{u^{11}}{11} + c$$

$$= \frac{u^{11}}{22} + c$$

* Fundemental Theorem of Calculas

* $f(x)$ is cont on $[a,b]$

∴ If $F(x)$ (anti derivative) Then

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

If $F(x) = \int_a^x f(t)\,dt$ Then

$F'(x) = f(x) - f(a)$

Area

$\int_a^b f(x)\,dx$ represents the area bounded between the curve $f(x)$ and x-axis iff $f(x) \geq 0$