« Applications of integration »

$$\acute{F}(x) = m$$

$$Y = X^2 + 3 \qquad \therefore \acute{Y} = 2X$$

$$Y_1 = X^2 - \pi \qquad \therefore \acute{Y}_1 = 2X$$

* $\int 2X\,dX = X^2 + C$ → عائلة المنحنيات

$X = S$ distance

V velocity — مشتقتها

$f = a$ acceleration — مشتقتها

بالنسبة ل t

$$V = \frac{dS}{dt} \qquad a = f = \frac{dV}{dt} = \frac{d^2S}{dt^2}$$

Ex 1] $M = -2X$

$$\frac{dY}{dX} = \frac{df(x)}{dX} = -2X$$

$$Y = f(x) = -2\int X\,dX = -X^2 + C$$

at $[1,1]$ $\quad 1 = -1 + C \quad \therefore C = 2$

$$Y = -X^2 + C \Rightarrow Y = -X^2 + 2$$

Ex 2] $M = 4X \quad , (1,5)$

$$\frac{dY}{dX} = \frac{df(x)}{dX} = 4X$$

$$Y = f(x) = 4\int X\,dX = 2X^2 + C$$

at $(1,5)$

$$5 = 2 \times 1 + C \quad \therefore C = 3 \Rightarrow Y = 2X^2 + 3$$

Ex 3] $m = \sqrt{x}$, $(9, 18)$

$$\frac{dy}{dx} = \frac{df(x)}{dx} = \sqrt{x}$$

$$y = f(x) = \int \sqrt{x}\, dx = \int x^{\frac{1}{2}} dx = \frac{2}{3} x^{3/2} + C$$

aT $(9,18)$

$$18 = \frac{2}{3} \times 9^{3/2} + C \quad \therefore C = 0 \quad \Rightarrow y = \frac{2}{3} x^{3/2}$$

Ex 4] $m = \frac{x}{y}$, $(4, 2)$

$$\frac{dy}{dx} = \frac{df(x)}{dx} = \frac{x}{y}$$

$y\, dy = x\, dx$ «بتكامل الطرفين»

$$\int y\, dy = \int x\, dx \cancel{+C}$$

$$\frac{y^2}{2} = \frac{x^2}{2} + C$$

aT $(4,2)$

$\frac{4}{2} = \frac{16}{2} + C \quad \therefore C = -6 \Rightarrow y^2 = x^2 - 12$ [ضربنا في 2]

Ex 5] $m = \frac{x}{1+x^2}$, $(3, 5)$

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

$$y = f(x) = \int \frac{x}{1+x^2} dx = \frac{1}{2} \int \frac{2x}{1+x^2} dx$$

$y = \frac{1}{2} \ln|1+x^2| + C$ aT $(3,5)$ $5 = \frac{1}{2} \ln|1+3^2| + C \quad \therefore C = \frac{10 - \ln 10}{2}$

$\therefore y = \frac{1}{2} \ln|1+x^2| + 5 - \frac{1}{2} \ln 10$ أو $5 - \frac{1}{2} \ln 10$

التاريخ: / /

الموضوع: ________

Partical moves along ---- $(0,0)$ $t=0$

$v = 4t$, $(0, 4)$

$v = 6T + 3$, $(1, 3)$

$v = 3T^2 + 2T$, $(2, 4)$

$v = \sqrt{T} + 5$, $(4, 9)$