جامعة الفرات الاوسط التقنية /المعهد التقني سماوة

قسم البناء والانشاءات .....

المحاضرة الخامسة عشر

اسم المادة /الرياضيات .

المرحلة الدراسية / الاولى

العام الدراسي / 2022 - 2023

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Definite Integration :

The (Definite Integration) is used to find (Areas and volumes) .

If (F) is a continuous function on in interval 〔a , b〕 then :

$F(x) = \int F(X) \; . dx$

$\int F(x).dx = F(x)\,]_a^b = F(b) - F(a)$

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EX. $\int_0^1 x^2 \, . \; dx = \frac{x^3}{3}]_0^1 = \frac{1}{3}(1^3 - 0^3) = \frac{1}{3}$.

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EX. $\int_0^{\frac{\pi}{2}} \sin x \, . dx = -\cos x)_0^{\frac{\pi}{2}} = -(\cos\frac{\pi}{2} - \cos 0) = -(0 - 1) = 1$

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EX. $\int_{-2}^{-1} \frac{dx}{x} = -\text{Ln.}\,|x|)_{-2}^{-1} = -(\text{Ln.}\,|-1| - \text{Ln.}\,|-2| = -(\text{Ln.}\,1 - \text{Ln.}\,2) = -(0 - 0.693)$

$= 0.693$

.....

EX. $\int_0^1 e^x \, . dx = e^x\,]_0^1 = e^1 - e^0 = e - 1$

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EX. $\int_{\pi}^{\frac{3\pi}{2}} \sin x \, . \cos x \, . dx = \frac{1}{2}(sin^2(\frac{3\pi}{2}) - sin^2(\pi))$

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

$= \frac{1}{2}$

.....

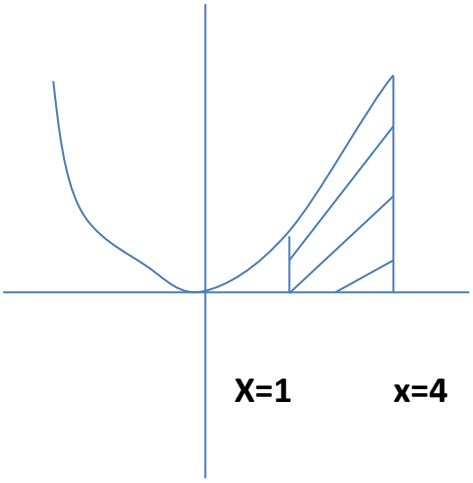
Example :

Find area under curve if (y= x^2) and surrounding between

(x= 1 and x= 4) ?

A = $\int_1^4 x^2 . dx = \frac{x^3}{3} \Big]_1^4$

$= \frac{4^3}{3} - \frac{1}{3} = \frac{63}{3} = 21$ square unit



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Example :

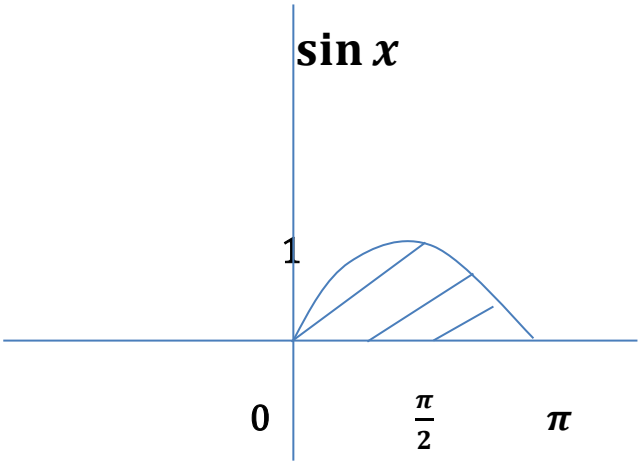
Find area under curve if (y= $sin\ x$) and surrounding between

(x= 0 and x= π) ?

A = $\int_0^\pi sin\ x . dx = -\cos x \Big]_0^\pi$

$= - \left[\cos \pi - \cos 0 \right]$

$= - \left[-1 - 1 \right] = 2$ square unit



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H.W :

Find area under curve if (y= $X^3 - 6x^2 + 8x$) and surrounding between (x= 0 and x= 2) ?

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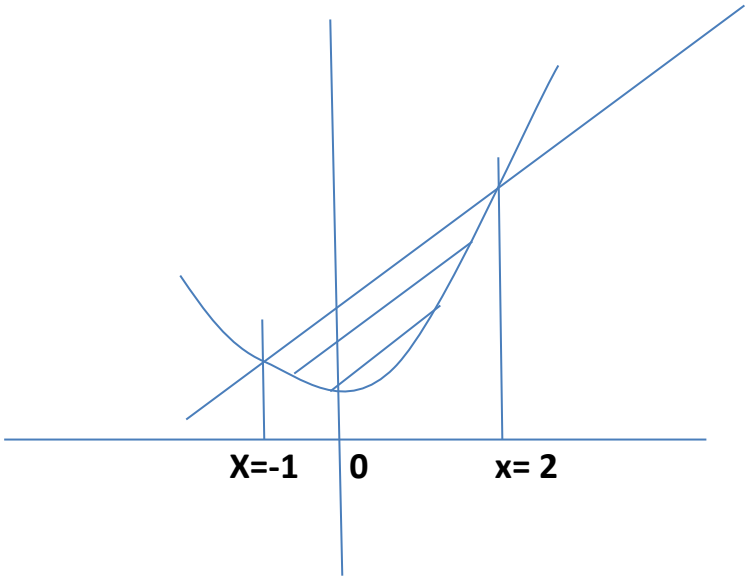
Find area between curves if (y_1 = $x + 3$) and (y_2 = $x^2 + 1$) between (x= -1 and x= 2) from the following figure ?



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