

Lecture (35-40) By Iqra Azhar

(1) Volume of cylinder has base b and height h is?

Ans:- $V = Ah$

(2) Plane curve not a line lie in — plane

2d Plane (2 Dimension).

(3) $\int_{-2}^2 |x| dx = ?$ $0 \Rightarrow \left| \frac{x^2}{2} \right|_{-2}^2 \Rightarrow (2)^2/2 - (-2)^2/2 = 2 - 2 = 0$

(4) $\lim_{x \rightarrow 0} \frac{e^{x^2} - 1}{\cos x - 1} = 0$

(5) derivative of $a-x$ is while a is constant

$\Rightarrow \frac{d}{dx}(a-x) = 0 - 1 \Rightarrow -1$

(6) Unit of Work is: Joule (300J) (Joule dyne, ftb)

(7) Form of hospital Rule is $\left(\frac{0}{0} \right)^{\infty/\infty}, (-\infty, \infty)$ ^{correct answer}

(8) distance formula based on (Pythagoras theorem)

(9) length of curve $y=x$ 0 to 2 is =

Solution: $L = \int_a^b \sqrt{1 + f'(x)^2} dx \Rightarrow \int_0^2 \sqrt{1 + (1)^2} dx \Rightarrow \int_0^2 \sqrt{2} = \sqrt{2}$

(10) Mean Value Theorem according $\lim_{x \rightarrow a} \frac{f(x) - f(a)}{x - a} = \lim_{x \rightarrow a} f'(x)$

11) If Force is 500 distance is 6 then Work is 3000.

$W = F \cdot d = 500 \times 6 = 3000$

(2) Pressure is = Force Per Unit Area = F/A

(13) $\lim_{n \rightarrow a} \frac{\ln \tan n}{\ln n} = 0$

14) smooth is function have same continuous derivatives and order of derivatives.

length of whole Polygonal Path is $\int \sum_{k=1}^n \sqrt{1 + (f'(x_k))^2} \Delta x_k$

If $f(x)/g(x)$ is in intermediate form we can use L-Hospital Rule. Yes.
 If $f(x)$ at $[-1, 2] = 4$ and $g(x) [-1, 2] = 8$
 then $2(f(x)) + 3g(x) = 2(4) + 3(8) = 8 + 24 = 32$

$$\int_0^1 (1-2x) = 0 \Rightarrow (x-x^2)' \Rightarrow (1-1^2) - (0-0^2) = 0-0=0$$

$$\int e^{-x} dx = e^{-1}/e$$

$y = 3x$ ~~from~~ $[0, 1] =$ length $= \int_0^1 \sqrt{1+(3)^2} dx = \sqrt{10} \int_0^1 1 dx = \sqrt{10}$
 $y = x$ 0 to 2 is $\int_0^2 \sqrt{1+1} dx = \sqrt{2} \int_0^2 1 dx = 2\sqrt{2}$
 $y = x$ 0 to 4 length is $\int_0^4 \sqrt{1+1} dx = \sqrt{2} \int_0^4 1 dx = 4\sqrt{2}$

$W = F \cdot d$
 $y = \sin x$ $[0, \pi]$ length $= \int_0^\pi \sqrt{1+(\cos x)^2} dx$

$y = 4x$ $[0, 1] = \int_0^1 \sqrt{1+(4)^2} dx = \sqrt{17} \int_0^1 1 dx = \sqrt{17}$
 $y = x^2$ 0 to 2 length $= \int_0^2 \sqrt{1+(2x)^2} dx = \int_0^2 \sqrt{1+4x^2} dx$

$(2, 5)$ $(-1, 1)$ distance $= \sqrt{(-1-2)^2 + (1-5)^2} = \sqrt{9+16} = \sqrt{25} = 5$

$(3, -2)$ $(4, 0)$ distance $= \sqrt{(4-3)^2 + (0-(-2))^2} = \sqrt{1+4} = \sqrt{5}$

Volume of washer $\perp$ to x-axis

$$\int_a^b \pi [f(x)^2 - g(x)^2] dx$$

Pascal $= N/m^2$

Work = Joule Units

If flat surface area ^{sub}merged horizontally in fluid at depth D F is perpendicular to surface. $F = ?$

$$F = \rho h A$$

Volume of cylindrical shell is $(\pi r_2^2 - \pi r_1^2)h$

$$\lim_{n \rightarrow 0} \frac{\sin 2n}{2} = 2$$

$$V \text{ of solid} = \pi \int_a^b R(x^2) dx$$

$$\int_0^2 x(x^2+1) dx = 62$$

soln- $x^2+1=4 \Rightarrow du = 2x dx \Rightarrow \frac{du}{2} = x dx$

$$4 = (2^2)+1 = u=5 \quad u = (0)^2+1 = 1$$

$$\int_1^5 \frac{u^3 du}{2} = \frac{1}{2} \left[\frac{u^4}{4} \right]_1^5 = \frac{1}{8} [5^4 - 1^4]$$

$$= \frac{1}{8} [625 - 1] = \frac{1}{8} [624] = 78$$

$$\text{or } \frac{1}{2} \int_0^2 \frac{u^4}{4} = \frac{1}{8} [u^4]$$

(x^2-1) has critical path = $1/2$.

$$V = \int_a^b 2\pi (f(x)) dx$$