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(1) Defination of fxn.

(2) Mapping Method

(3) Testing of fxn.

(4) Wavy Curve Method

Types of fxn.

ILATE

- Algebric
  - Polynomial
  - Rational
  - Irr. fxn
  - Piecewise
    - Modulus
    - GIF [ ]
    - FPF { }
    - Sgn fxn
    - Defined fxn
- {Transcendental}
  - L → log
  - I → Inverse
  - T → Trigo fxn
  - E → Exponential

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$f(x) = x^3 - 3$ is Monic Poly.

A) Polynomial fxn.

1) $f(x) = a_0 x^n + a_1 x^{n-1} + a_2 x^{n-2} + \dots + a_{n-1} x + a_n$ is Polynomial fxn.

Polynomial.

$f(x) = a$ Constant fxn

$f(x) = \boxed{a} x^1 + \boxed{b}$ Linear fxn

$f(x) = \boxed{a} x^2 + bx + \boxed{c}$ Quad fxn

$f(x) = \boxed{a} x^3 + bx^2 + cx + \boxed{d}$ Cubic fxn

$f(x) = ax^{17} + bx^2 + c$

$f(x) = ax^{17} + bx^{16} \dots$ it is also Polynomial fxn of deg 17.

Monic Poly

L.C. = 1

$f(x) = \boxed{2} x^3 - 3$

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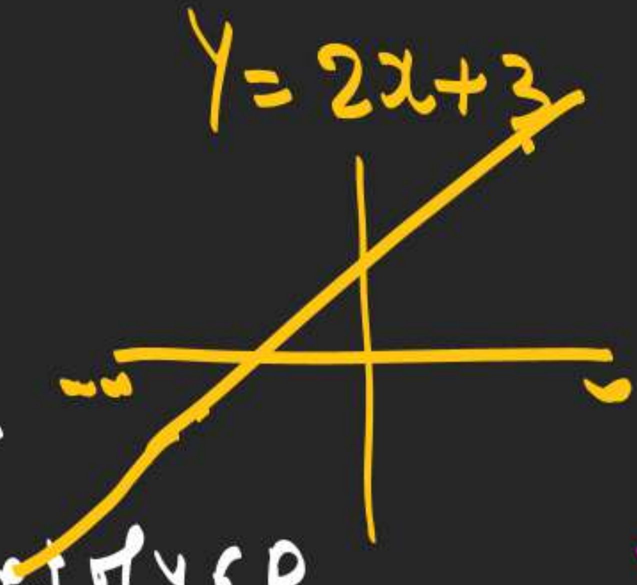
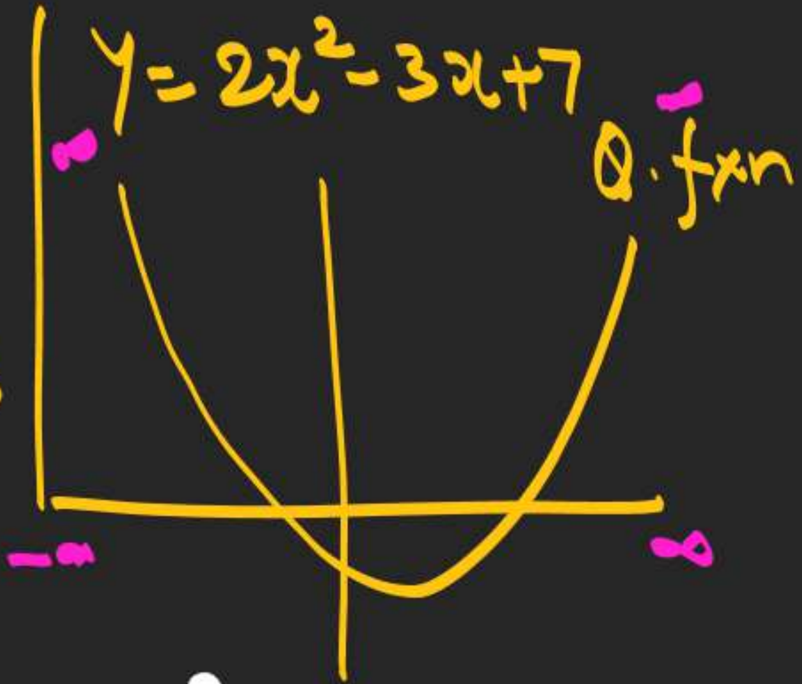




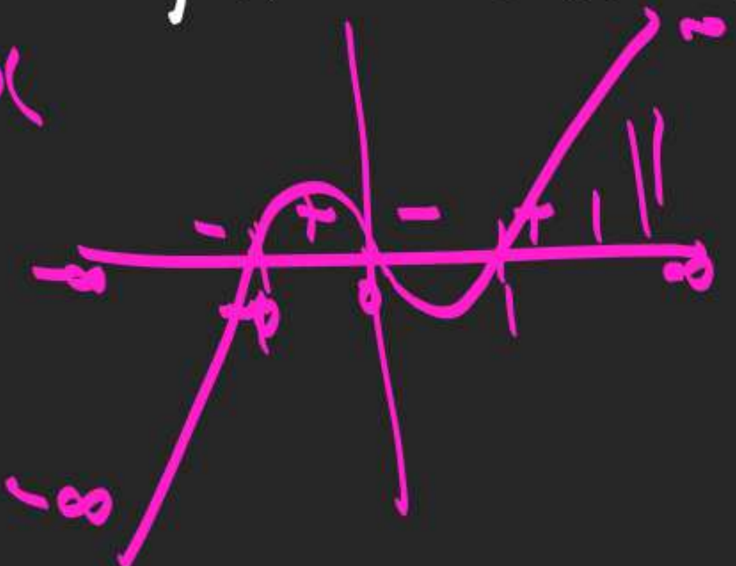
(2) Domain of all Poly. fxn is $x \in R$.

(3) Range of all odd deg. Poly $Y \in R$

(4) Range all even deg Poly is subset of $Y \in R$.

	Dom.		Range
$f(x) = 2x^1+3$	$x \in R$	odd	$Y \in R$
$f(x) = 2x^2-3x+7$	$x \in R$	Even	Subset of R
$f(x) = 2x^3-3x^2+7$	$x \in R$	odd	$Y \in R$

$Y = x^3 - x$



$R_f \in R$

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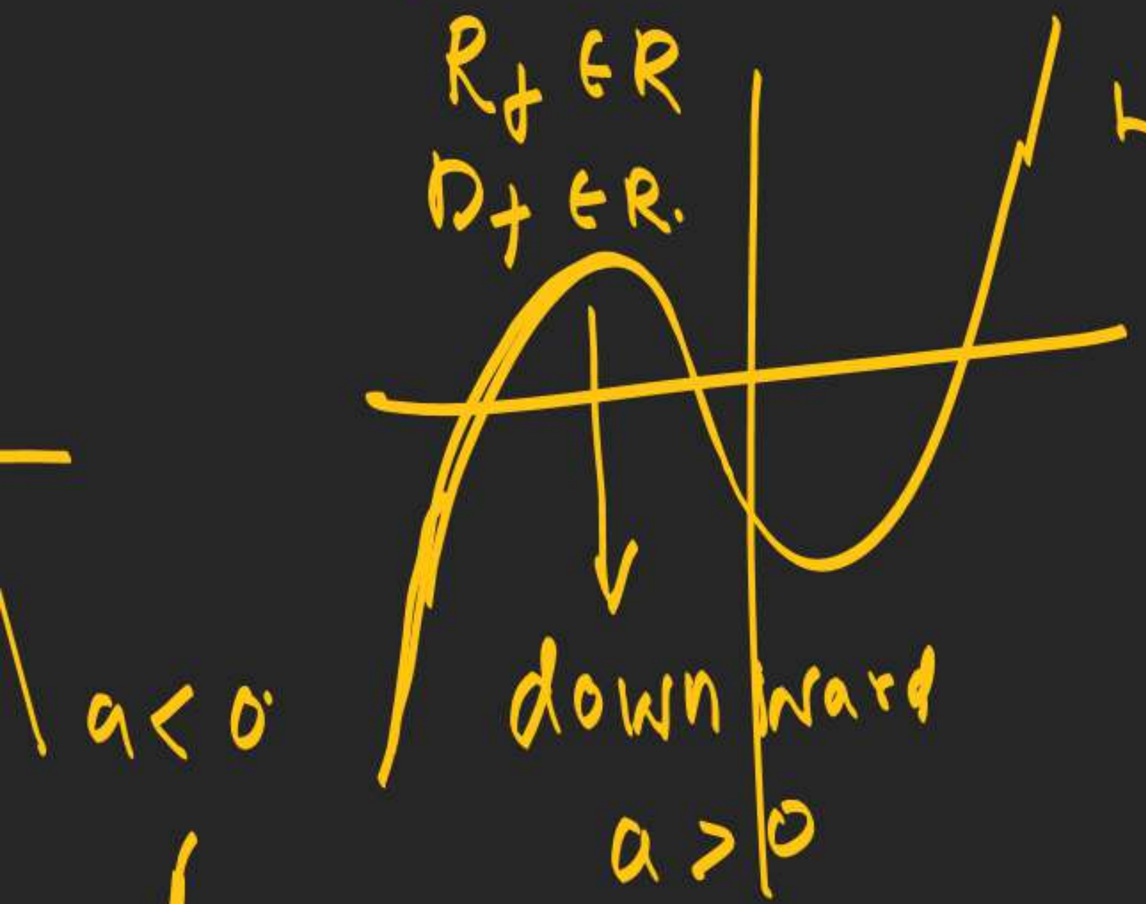
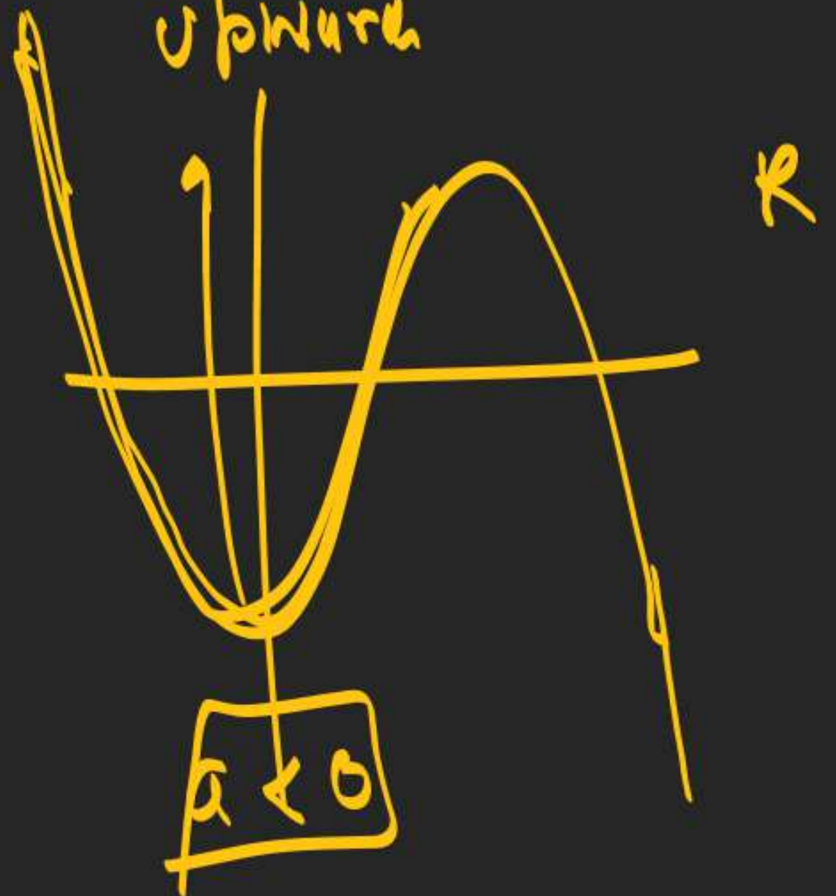
odd deg के graphs Even के उल्टे

(C) $f(x) = ax^3 + bx^2 + cx + d$

$R_f \in R$

$D_f \in R$





$f(x) = x^3 - 3x^2 + 7 \rightarrow$ L.C $\rightarrow$ 1 ⊕ downwa.

$f(x) = -3x^3 + 2x + 5 \rightarrow$ LC = -3 ⊖ Upward

Even

(D) $f(x) = ax^4 + bx^3 + cx^2 + dx + e$

Biquad fxn.

$f(x) = -3x^4 + 2x + 9$

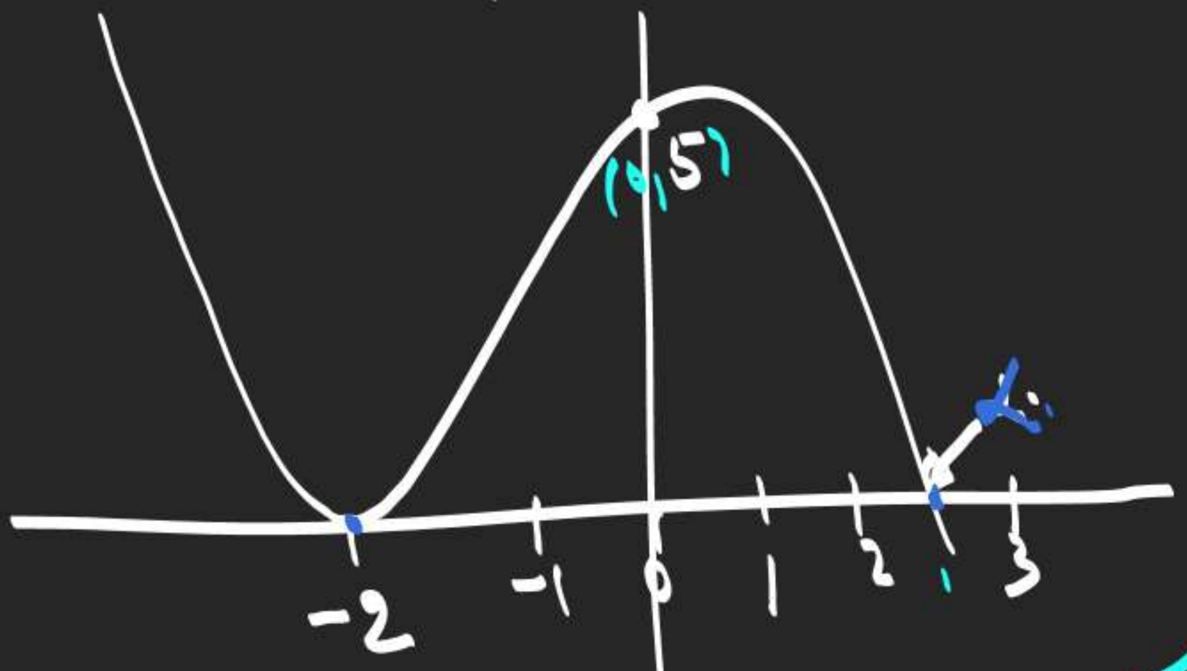
LC = -3 ⊖ Downwa

see graph

find $f(x)$ if $\boxed{f'(x) = 3 \text{ at } (0,5)}$

$f'(0) = 3$

मतलब



Touch

let $f(x) = \boxed{A}(x+2)^2(x-\alpha)$

$\boxed{\text{Prod.}}$

$f(0) = 5$

$x=0$

$5 = A(0+2)^2(0-\alpha)$

$\boxed{-4A\alpha = 5}$ ①

$f'(x) = A\{(x+2)^2 \cdot 1 + (x-\alpha)2(x+2)\cdot 1\}$

$x=0$

$3 = A\{(0+2)^2 + 2(0-\alpha)\cdot(0+2)\}$

$3 = A\{4 - 4\alpha\} \Rightarrow 4A + 5 = 3$

$4A = -2 \Rightarrow \boxed{A = -\frac{1}{2}}$

$+4 \times \frac{1}{2}\alpha = 5$

$\alpha = \frac{5}{2}$

$$\boxed{f(x) = -\frac{1}{2}(x+2)^2\left(x-\frac{5}{2}\right)}$$

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Q If Polynomial $P(x) = x^6 + ax^5 + bx^4 + cx^3 + dx^2 + ex + f$

is Such that $\boxed{P(1)=1, P(2)=2, P(3)=3, P(4)=4, P(5)=5, P(6)=6}$

then $P(7) = ?$

Mn me ata hai → $P(x) = x$

Hua Kese

↓

Kal.

$P(x) = 1\cdot(x-1)(x-2)(x-3)(x-4)(x-5)(x-6) + x$

$P(1) = (1-1)(1-2)(1-3)(1-4)(1-5)(1-6) + 1 = 0 + 1 = 1$

$P(2) = (2-1)(2-2)(2-3)(2-4)(2-5)(2-6) + 2 = 0 + 2 = 2$

Now

$P(7) = (7-1)(7-2)(7-3)(7-4)(7-5)(7-6) + 7$

$6 \times 5 \times 4 \times 3 \times 2 \times 1 + 7 = 720 + 7 = 727$

Domain → A) value of x where $f(x)$ is defined

B) Expansion of graph on X-Axis

(I)

$\dfrac{1}{f(x)}$	→ $f(x) \neq 0$
$\sqrt{f(x)}$	$f(x) \geq 0$
$\dfrac{1}{\sqrt{f(x)}}$	$f(x) > 0$

(II) If fxn has sum / diff / Product

$$h(x) = f(x) \overset{\times}{\pm} g(x)$$

$$D = D_1 \cap D_2$$

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Q_1 $f(x) = \underbrace{\sqrt{x+2}}_{}^{\sqrt{f(x)}} + \underbrace{\sqrt{x-5}}_{}^{\sqrt{f(x)}}$

find D_f ?

$x+2 \geq 0$ $\quad\cap\quad$ $x-5 \geq 0$

$x \geq -2$ $\quad\cap\quad$ $\boxed{x \geq 5}$

$x \in [5, \infty)$

Q_2 $f(x) = \sqrt{x+2} - \sqrt{x-5}$ D_f ?

$x+2 \geq 0$ | $x-5 \geq 0$

$x \geq -2$ | $x \geq 5$

$x \in [5, \infty)$

Q_3 $f(x) = \sqrt{x+2} \times \sqrt{x-5}$ D_f ?

$x \geq -2 \cap x \geq 5 \longrightarrow x \in [5, \infty)$

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Q4 $f(x) = \dfrac{\sqrt{x+2}}{\sqrt{x-5}}$ find D_f?

$\dfrac{\sqrt{a}}{\sqrt{b}} \neq \sqrt{\dfrac{a}{b}}$

$f(x) = \sqrt{x+2} \times \dfrac{1}{\sqrt{x-5}}$ $\leftarrow \dfrac{1}{\sqrt{f(x)}}$

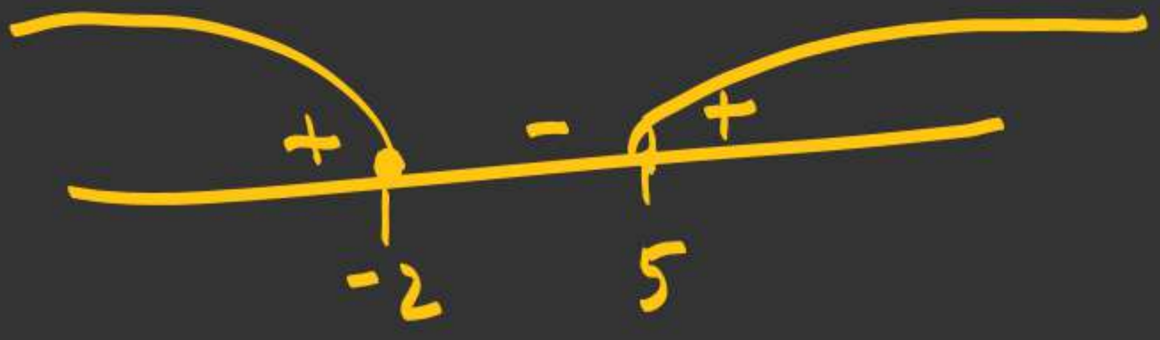
$x+2 \geq 0$	$x-5 > 0$
$x \geq -2$	$x > 5$

$x \in (5, \infty)$

Q5 $f(x) = \sqrt{\dfrac{x+2}{x-5}}$ find D_f?

$\sqrt{g(x)}$

$\dfrac{(x+2)}{(x-5)} \geq 0$



$x \in (-\infty, -2] \cup (5, \infty)$

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Q: $f(x) = \sqrt[3]{\dfrac{x+2}{x-5}}$ find Dom?

$f(x) = \sqrt[6]{\dfrac{x+2}{x-5}}$

$= \left(\dfrac{x+2}{x-5}\right)^{1/6}$

$f(x) = \left(\dfrac{x+2}{x-5}\right)^{1/3} \rightarrow$ Jab b deg $\dfrac{1}{\text{odd}}$ ho behave Like "No Deg"

$$\boxed{f(x) = \left(\frac{x+2}{x-5}\right)^{1/3} \text{ Ka dom} = f(x) = \left(\frac{x+2}{x-5}\right) \text{ Ka Dom}}$$

$f(x) = \dfrac{x+2}{x-5} = (x+2) \times \dfrac{1}{x-5} \rightarrow \dfrac{1}{f(x)}$

Linear fxn.
Poly.
$x \in R$

$x - 5 \neq 0$

$x \neq 5$

$-\infty$ ... 5 ... ∞

$x \in R - \{5\}$

RELATION FUNCTION

Q7 $f(x) = \sqrt[8]{\dfrac{x+2}{x-5}}$ find D_f?

$$\sqrt{\sqrt{\sqrt{\frac{x+2}{x-5}}}} \leftarrow f(x) = \left(\frac{x+2}{x-5}\right)^{1/8} \rightarrow \frac{1}{\text{Even}}$$

Jab b deg $\frac{1}{\text{Even}}$ ho Behave like $\sqrt{f(x)}$

$$\boxed{f(x) = \left(\frac{x+2}{x-5}\right)^{\frac{1}{8}} \text{ Ka Dom} = f(x) = \sqrt{\frac{x+2}{x-5}} \text{ Ka Dom.}}$$

$$\frac{x+2}{x-5} \geq 0$$

$+ \quad -2 \quad - \quad 5 \quad +$

$x \in (-\infty, -2] \cup (5, \infty)$

RELATION FUNCTION

Q. The angles α and β are such that $\tan\alpha = \overset{=5}{m} + 2$ and $\tan\beta = \overset{3}{m}$ where m is a constant. If $\sec^2\alpha - \sec^2\beta = 16$ then the value of $\boxed{\cot(\alpha-\beta)}$ is equal to

(A) 2

(B) 4

(C) 6

(D) 8

$\cancel{1} + \tan^2\alpha - (\cancel{1} + \tan^2\beta) = 16$

$(m+2)^2 - m^2 = 16 \longrightarrow m = 3$

$\cot(\alpha-\beta) = \dfrac{1}{\tan(\alpha-\beta)} = \dfrac{1+\tan\alpha\cdot\tan\beta}{\tan\alpha - \tan\beta} = \dfrac{1+5\times 3}{5-3} = 8$

RELATION FUNCTION

Q. The equation $|x|^2 + |x| - 6 = 0$ has

(A) only one root

(B) four roots

(C) the sum of the roots is zero.

(D) the product of the roots is – 6.

$|x|^2 + |x| - 6 = 0$

$(|x|+3)(|x|-2) = 0$

$\cancel{|x| = -3}$ OR $|x| = 2$

$x = \pm 2$

$\text{Sum} = 2 + (-2) = 0$

$$n^2+6n+9 = a(n^2+4n+4)+b(n^2+2n+1)+\cancel{c}\,(n^2$$

$$n^2+6n+9 = n^2(a+b+c)+n(4a+2b)+(4a+b)$$

$a+b+c=1$ | $2a+b=3$ | $4a+b=9$

$6-3$ $12-3$

$a=3,\ b=-3,\ c=1$

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RELATION FUNCTION

Q. The real number x and y satisfy the equation $xy = \sin(2t)$ and $\frac{x}{y} = \tan(t)$ where $0 < t < \frac{\pi}{2}$. The value of $x^2 + y^2$, is

(A) $\sqrt{2}$

(B) 1

(C) 2

(D) 4

$xy \times \frac{x}{y} = \sin 2t \times \tan t$

$x^2 = 2\sin t \cancel{\cos t} \times \frac{\sin t}{\cancel{\cos t}}$

$x^2 = 2\sin^2 t$

$\frac{xy}{\left(\frac{x}{y}\right)} = \frac{\sin 2t}{\tan t} = \frac{2\cancel{\sin t}\cos t}{\frac{\cancel{\sin t}}{\cos t}} = 2\cos^2 t$

$y^2 = 2\cos^2 t$

$\boxed{x^2 + y^2 = 2}$

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RELATION FUNCTION

Q. How many distinct real numbers belongs to the following collection

$$\left\{\ln(4-\sqrt{15})\,;\ln(4+\sqrt{15})\,;-\ln(4-\sqrt{15})\,;-\ln(4+\sqrt{15})\,;\ln\left(\frac{4+\sqrt{15}}{4-\sqrt{15}}\right);\ln(31+8\sqrt{15})\right\}$$

(A) 2

Kal.

(B) 3

(C) 4

(D) 5

RELATION FUNCTION

Q. In the range $0 \le x < 2\pi$, the equation $\boxed{\cos(\sin x) = \frac{1}{2}}$ has

(A) no solution

(B) one solution

(C) two solutions

(D) three solutions