

Open Mind Guruji

Function: Lecture 03

Q.20. $f(x) = x^2 + 4$
Solve $f(x+1) - f(x-1) - 12 = 0$
← given

$f(x) = x^2 + 4$ — (1)

- Put $x = x+1$ in eq (1)
 $f(x+1) = (x+1)^2 + 4$
 $(a+b)^2 = a^2 + b^2 + 2ab$
 $= x^2 + 1^2 + 2 \cdot x \cdot 1 + 4$
 $= x^2 + 1 + 2x + 4$
 $f(x+1) = x^2 + 2x + 5$ — (2)
- Put $x = x-1$ in eq (1)
 $f(x-1) = (x-1)^2 + 4$
 $(a-b)^2 = a^2 + b^2 - 2ab$
 $= x^2 + 1^2 - 2 \cdot x \cdot 1 + 4$
 $= x^2 + 1 - 2x + 4$
 $f(x-1) = x^2 - 2x + 5$ — (3)

Now, we can solve
 $f(x+1) - f(x-1) - 12 = 0$
Put value of $f(x+1)$ & $f(x-1)$ from eq (2) & (3)
 $x^2 + 2x + 5 - [x^2 - 2x + 5] - 12 = 0$
 $x^2 + 2x + 5 - x^2 + 2x - 5 - 12 = 0$
 $4x - 12 = 0$
 $4x = 12$
 $x = \frac{12}{4}$
 $x = 3$



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Q.24 $y = f(x) = \frac{x+1}{x-1}$

Show that
 $x = f(y)$
← given

$f(x) = \frac{x+1}{x-1}$ — (1)

- Put $x = y$ in eq (1)
 $f(y) = \frac{y+1}{y-1}$ — (2)
- Put $y = \frac{x+1}{x-1}$ in eq (2)
 $f(y) = \frac{\frac{x+1}{x-1} + 1}{\frac{x+1}{x-1} - 1}$
 $= \frac{\frac{x+1 + 1(x-1)}{x-1}}{\frac{x+1 - 1(x-1)}{x-1}}$
 $= \frac{x+1 + (x-1)}{x+1 - (x-1)}$
 $f(y) = \frac{x+1+x-1}{x+1-x+1}$
 $f(y) = \frac{x+x}{1+1}$
 $= \frac{2x}{2}$
 $f(y) = x$