Let X = {– 1, 0, 1}, Y = {0, 2} and a function f : X → Y defined by $\boxed{y = 2x^4}$, is

(a) one-one onto

(b) one-one into

(c) many-one onto

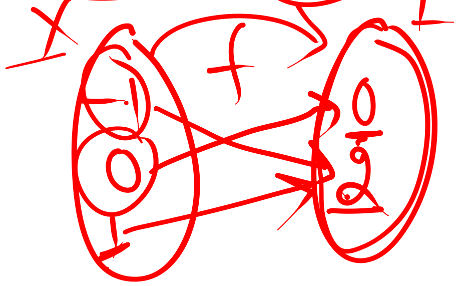
(d) many-one into

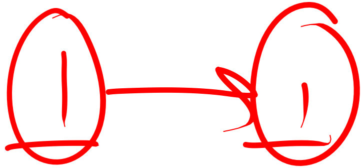
$y = 2x^4$

$y = 2(-1)^4 = 2$

$y = 2(1)^4 = 2$

$y = 2(0)^4 = 0$





one-one

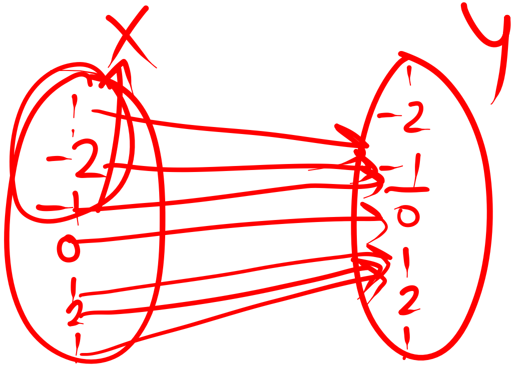
ABLES® KOTA

The signum function, $f : R \to R$ is given by

$$f(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0, & \text{if } x = 0 \\ -1 & \text{if } x < 0 \end{cases} \text{ is}$$

(a) one-one (b) onto

(c) many-one (d) None of these



$x > 0 \to 1, 2, 3 \to y = 1$

For binary operation * defined on $R-\{1\}$ such that $a * b = \dfrac{a}{b+1}$ is

(a) not associative
(b) not commutative
(c) commutative
(d) both (a) and (b)

$$= b * a$$

$$\frac{b}{a+1}$$

$$(a * b) * c = a * (b * c)$$

$$\left(\frac{a}{b+1}\right) * c = a * \left(\frac{b}{c+1}\right) = \frac{a}{\frac{b}{c+1}+1}$$

$$\frac{\frac{a}{b+1}}{c+1} \Rightarrow \frac{a}{(b+1)(c+1)}$$

Given $f(x) = \log\left(\frac{1+x}{1-x}\right)$ and $g(x) = \frac{3x+x^3}{1+3x^2}$, then $f\circ g(x)$ equals

(a) $-f(x)$

(b) $3f(x)$

(c) $[f(x)]^3$

(d) None of these

$\log M^N = N \log M$

$f[g(x)]$

$\Rightarrow f\left[\frac{3x+x^3}{1+3x^2}\right] = f(x)$

$f\circ g(x)$

$(a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$

$(a-b)^3 = a^3 - b^3 - 3a^2b + 3ab^2$

$(1-x)^3$

$f\left[\frac{3x+x^3}{1+3x^2}\right] = \log\left[\frac{1+\frac{3x+x^3}{1+3x^2}}{1-\frac{3x+x^3}{1+3x^2}}\right]$

$= \log\left[\frac{1+3x+3x^2+x^3}{1+3x^2-3x-x^3}\right] = \log\left[\frac{(1+x)^3}{(1-x)^3}\right] = \log\left[\frac{1+x}{1-x}\right]^3 = 3\log\left[\frac{1+x}{1-x}\right]$

$= 3f(x)$

Let $f : R - \left\{\frac{3}{5}\right\} \to R$ be defined by $f(x) = \frac{3x+2}{5x-3}$. Then

(a) $f^{-1}(x) = f(x)$

(b) $f^{-1}(x) = -f(x)$

(c) $(fof)x = -x$

(d) $f^{-1}(x) = \frac{1}{19} f(x)$

$f(x) = \frac{3x+2}{5x-3} = y$

$\Rightarrow 3x+2 = 5xy - 3y$

$\Rightarrow 3y+2 = 5xy - 3x$

$3y+2 = x(5y-3)$

$\boxed{x = \frac{3y+2}{5y-3}}$

$f^{-1}(y)$

$f^{-1} \to$ inverse of f

$f(x) \to f^{-1}(x)$

If R = {(x, y) : x is father of y}, then R is

(a) reflexive but not symmetric

(b) symmetric and transitive

(c) ~~neither reflexive nor symmetric nor transitive~~

(d) Symmetric but not reflexive

$(x, y)\ (y, z) \in R$

$\downarrow$

$(x, z) \notin R$

$(x, y) \in R$ and $(y, z) \in R$

$\downarrow$

$(x, z) \in R$

father $x \longrightarrow y$ Sone $\longrightarrow z$

$(x, x) \notin R$

Refx

$(x, y) \rightarrow (y, x) \notin R$

$(x, y) \rightarrow x^{\text{father}}\ y^{\text{son}}$

$(y, z) \rightarrow y^{\text{father}}\ z^{\text{son}}$

$x \quad y \quad z$

$(x, z) \rightarrow \boxed{x^{\text{father}}\ z^{\text{son}}}$

Which of the following functions from Z into Z are bijective?

(a) $f(x) = x^3$

(b) $f(x) = x + 2$

(c) $f(x) = 2x + 1$

(d) $f(x) = x^2 + 1$

one-one + onto

$x = \frac{y-1}{2} = \frac{1}{2}$

$y = x^3 \Rightarrow x = (y)^{1/3} = (2)^{1/3}$

Which of the following is not a binary operation on the indicated set?

(a) On Z^+, * defined by $\boxed{a * b = a - b}$

(b) On Z^+, * defined by $a * b = ab$

(c) On R, * defined by $a * b = ab^2 = -2(4) = -8$

(d) None of the above

$a = 2, b = 1 \rightarrow a * b = 2 - 1 = 1 \in Z^+$

$a = 1, b = 2 \Rightarrow 1 - 2 = \boxed{-1 \notin Z^+}$

$2, 2 \Rightarrow a * b = 4 \in Z^+$ $\quad a = 2$

$3, 6 = 18 \in Z^+$ $\quad b = -2$

$a = 2, b = -1 \Rightarrow 2 \in R$

Consider the following statements

I. Addition, subtraction and multiplication are binary operations on R.

II. Division is a binary operation on R but not a binary operation on non-zero real numbers.

(a) Only I is true

(b) Only II is true

(c) Both I and II are true

(d) Neither I nor II is true

$a * b = a + b$

$a - b$

$a \cdot b$

$a * b = a/b$

$R \rightarrow a = 5, b = 0$

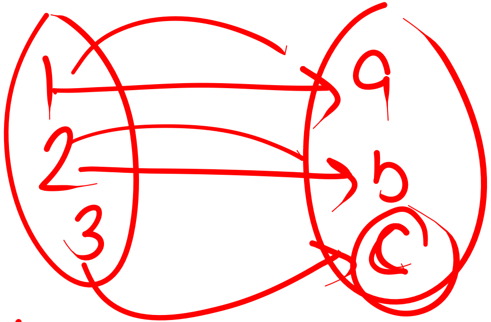
$5/0 = \infty$

$5/0 \in R$

Let A = {1, 2, 3} and B = {a, b, c}, and let f = {(1, a), (2, b), (P, c)} be a function from A to B. For the function f to be one-one and onto, the value of P =

(a) 1 (b) 2

(c) 3 (d) 4



$(3, c) \to (P, c)$

1	2	3	4	5	6	7	8	9	10
C	C	D	B	A	C	B	A	A	C