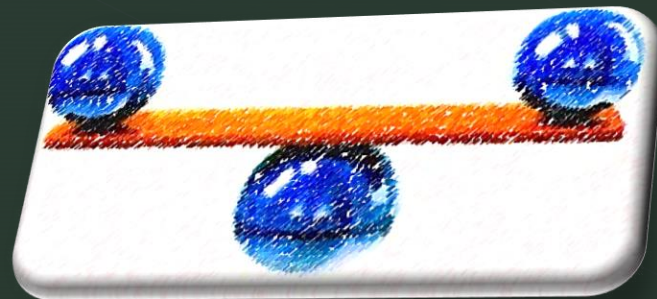


Equality of two algebraic fractions



Reduce each of the following algebraic fractions and mention the domain of each one :

$$1 \quad n_1(x) = \frac{2x+4}{x^2-4}$$

$$2 \quad n_2(x) = \frac{x^3+2x^2-35x}{x^3-25x}$$

$$1) \quad n_1(x) = \frac{2(\cancel{x+2})}{(\cancel{x+2})(x-2)}$$

$$\text{Domain} = \mathbb{R} - \{2, -2\}$$

$$n_1(x) = \frac{2}{x-2}$$

$$2) \quad n_2(x) = \frac{x(x^2+x-35)}{x(x^2-25)} = \frac{x(\cancel{x-5})(x+7)}{x(x+5)(\cancel{x-5})}$$

$$\text{Domain} \rightsquigarrow \mathbb{R} - \{0, -5, 5\}$$

$$\boxed{\frac{\cancel{x-7}}{\cancel{x+5}}}$$

In each of the following : If n_1 and n_2 are two algebraic fractions ,
 is $n_1 = n_2$? Why ?

1 $n_1(x) = \frac{x^2 - 5x}{x^2 - 7x + 10}$, $n_2(x) = \frac{3x - 15}{3x^2 - 21x + 30}$

$$\frac{\cancel{x}(x-5)}{(x-2)\cancel{(x-5)}}$$

domain $\mathbb{R} - \{2, 5\}$

$$n_1(x) = \frac{x}{x-2}$$

$$n_1 \neq n_2$$

$$\frac{\cancel{3}(x-5)}{\cancel{3}(x-2)\cancel{(x-5)}}$$

domain $\mathbb{R} - \{2, 5\}$

$$n_2(x) = \frac{1}{x-2}$$

$$\sim \text{so } n_1(x) \neq n_2(x)$$

$$2 \quad n_1(x) = \frac{x^2 + x - 6}{x^2 - 3x + 2}, \quad n_2(x) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$$

$$= \frac{(x-2)(x+3)}{(x-2)(x-1)}$$

$$D_{\neq 0} R = \{2, 1\}$$

$$h_1(x) = \frac{x+3}{x-1}$$

$$D \text{ of } h_1 \neq D \text{ of } n_1$$

$$= \frac{(x+3)(x-5)}{(x-1)(x-5)}$$

$$D_{\neq 0} R = \{1, 5\}$$

$$\ll \frac{x+3}{x-1} \gg$$

$$h_2 \sim h_1 \neq n_2$$

$$3 \quad n_1(x) = \frac{x^2 - x}{x^3 - 2x^2}, \quad n_2(x) = \frac{x^2 - 3x + 2}{x^3 - 4x^2 + 4x}$$

$$\frac{x(x-1)}{x^2(x-2)}$$

$$x^2(x-2)$$

$$D \rightarrow \mathbb{R} - \{0, 2\}$$

$$h_1(x) = \frac{(x-1)}{x(x-2)}$$

$$D \text{ of } h_1 = D \text{ of } h_2$$

$$h_1(x) = h_2(x) \rightarrow n_1 = n_2$$

$$\frac{(x-2)(x-1)}{x(x^2 - 4x + 4)}$$

$$x(x^2 - 4x + 4)$$

$$\frac{(x-2)(x-1)}{x(x-2)(x-2)}$$

$$= \frac{(x-1)}{x(x-2)}$$

$$D = \mathbb{R} - \{0, 2\}$$

$$n_2(x) = \frac{x-1}{x(x-2)}$$

3

$$\text{If } n_1(x) = \frac{x^2 + 3x}{x^2 - 3x}, \quad n_2(x) = \frac{x^2 + 10x + 21}{x^2 + 4x - 21}$$

Prove that :

$n_1(x) = n_2(x)$ for all the values of x which belong to the common domain and find this domain.

$$\frac{x(x+3)}{x(x-3)} = \frac{x+3}{x-3}$$

$$\left\{ \mathbb{R} - \{0, 3\} \right\}$$

$$\frac{\cancel{(x+7)}(x+3)}{(x-3)\cancel{(x+7)}} = \frac{x+3}{x-3}$$

$$\left\{ \mathbb{R} - \{3, 7\} \right\}$$

$$n_1(x) = n_2(x) \sim \forall x \in C \subseteq D \mathbb{R} - \{0, 3, 7\}$$

If $n_1(x) = \frac{x}{x+a}$, $n_2(x) = \frac{x^3 + bx}{x^3 + ax^2 + x + 5}$ and $n_1 = n_2$

, then find the value of each of a and b

Domain of $n_1 = \mathbb{R} - \{-a\}$
 $-a \notin \text{Domain of } n_1 \text{ and } n_2$



$$-a^3 + a^3 - a + 5 = 0$$

$$-a + 5 = 0 \rightarrow a = 5$$

$$n_1(x) = \frac{x}{x+5}$$

$$n_2(x) = \frac{x^3 + bx}{x^3 + 5x^2 + x + 5}$$

$$\frac{x(x^2 + b)}{x^2(x+5) + (x+5)}$$

$$= \frac{x(x^2 + b)}{(x+5)(x^2 + 1)}$$

$$b = 1$$