College Algebra

1 | Equations and Inequalities

1.1 | Linear Functions

QUESTION [19] 1.1.73

Solve for x,

$$\frac{1}{x-a}+\frac{1}{x+a}=\frac{2}{x-1}$$

ANSWER

$$x=a^2$$

EXAM SOLUTION

$$\frac{1}{x-a}+\frac{1}{x+a}=\frac{2}{x-1} \;\Rightarrow\; [(x-1)(x+a)(x-a)]\left[\frac{1}{x-a}+\frac{1}{x+a}=\frac{2}{x-1}\right]$$

$$\Rightarrow\; \frac{(x-1)(x+a)(x-a)}{x-a}+\frac{(x-1)(x+a)(x-a)}{x+a}=\frac{2(x-1)(x+a)(x-a)}{x-1}$$

$$\Rightarrow\; (x-1)(x+a)+(x-1)(x-a)=2(x+a)(x-a)$$

$$\Rightarrow\; (x^2+ax-x-a)+(x^2-ax-x+a)=2(x^2-ax+ax-a^2)$$

$$\Rightarrow\; x^2+ax-x-a+x^2-ax-x+a=(2x^2-2a^2)$$

$$\Rightarrow\; 2x^2-2x=2x^2-2a^2$$

$$\Rightarrow\; -2x=-2a^2$$

$$\Rightarrow\; x=a^2.$$

Thus,

$$x=a^2.$$