Rational Functions

14
Which of the following is a value of x for which the expression \( \frac{-3}{x^2 + 3x - 10} \) is undefined?
A) -3
B) -2
C) 0
D) 2
\[ f(x) = \frac{-3}{(x+5)(x-2)} = 0 \]
\[ x = -5, \quad x = 2 \]

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\[ x^2 - 10x + 25 + 4x - 20 + 4 = 0 \]
\[ x^2 - 6x + 9 = 0 \]
\[ (x-3)(x-3) = 0 \]
For what value of x is the function \( h \) above undefined?
\[ x = 3 \]

20
\[ f(x) = \frac{2x-4}{2x^2 + 2x - 4} \]
A rational function is defined above. Which of the following is an equivalent form that displays values not included in the domain as constants or coefficients?
A) \( f(x) = \frac{x-2}{x^2 + x - 2} \)
B) \( f(x) = \frac{2(x-2)}{2(x+2)(x-1)} \)
C) \( f(x) = \frac{1}{x+1} \)
D) \( f(x) = \frac{1}{2x^2} \)
13

Which of the following expressions is equivalent to \( \frac{x^2 - 2x - 5}{x - 3} \)?

A) \( x - 5 - \frac{20}{x - 3} \)

B) \( x - 5 - \frac{10}{x - 3} \)

C) \( x + 1 - \frac{8}{x - 3} \)

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

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Which of the following is equivalent to \( \frac{4x^2 + 6x}{4x + 2} \)?

A) \( x \)

B) \( x + 4 \)

C) \( x - \frac{2}{4x + 2} \)

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

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Ch. 5  
**Synthetic Division**

\[
\begin{array}{c|ccc}
3 & 1 & -2 & -5 \\
 & 3 & 3 & \\
\hline
1 & 1 & -2 \\
\hline
X + 1 & \frac{2}{x - 3} \\
\end{array}
\]

Ch. 5  
**Polynomial Long Division**

\[
\begin{array}{c}
4x + 2 \bigg| 4x^3 + 6x + 0 \\
& \underline{- (4x^3 + 2x)} \\
& 4x + 0 \\
& \underline{- (4x + 2)} \\
& -2 \\
\end{array}
\]
15. The expression $\frac{5x - 2}{x + 3}$ is equivalent to which of the following?

A) $\frac{5}{3}$  

B) $5 - \frac{2}{3}$  

C) $5 - \frac{2}{x + 3}$  

D) $5 - \frac{17}{x + 3}$

13. If $x > 3$, which of the following is equivalent to

\[
\left(\frac{x^3 + 1}{(x+3)(x+2)}\right) + \frac{1}{x+3} = \frac{1}{x+3} + \frac{x + 2}{(x+3)(x+2)} = \frac{1}{x^2 + 5x + 6} + \frac{2x + 5}{x^2 + 5x + 6}
\]

A) $\frac{2x + 5}{x^2 + 5x + 6}$  

B) $\frac{x^2 + 5x + 6}{2x + 5}$  

C) $2x + 5$  

D) $x^2 + 5x + 6$
8

\[ \frac{x + 1}{x + 1} = \frac{2}{x + 1} \]

In the equation above, which of the following is a possible value of \( x + 1 \)?

A) \( 1 - \sqrt{2} \)
B) \( \sqrt{2} \)
C) \( 2 \)
D) \( 4 \)

Cross Multiply

\[(x + 1)(x + 1) = 2\]
\[\sqrt{(x + 1)^2} = \sqrt{2}\]
\[x + 1 = \pm \sqrt{2}\]
\[(x + 1) = \sqrt{2} \quad \text{or} \quad (x + 1) = -\sqrt{2}\]

10

If \( \frac{t + 5}{t - 5} = \frac{10}{t} \), what is the value of \( t \)?

A) \( \frac{45}{11} \)
B) \( 5 \)
C) \( \frac{11}{2} \)
D) \( \frac{55}{9} \)

Cross Multiply

\[t + 5 = 10(t - 5)\]
\[-t + 50 = -t + 50\]
\[55 = \frac{9t}{q}\]

5

If \( \frac{5}{x} = \frac{15}{x + 20} \), what is the value of \( \frac{x}{5} \)?

A) \( 10 \)
B) \( 5 \)
C) \( 2 \)
D) \( \frac{1}{2} \)

\[15x = 5(x + 20)\]
\[15x = 5x + 100\]
\[-5x = -5x\]
\[10x = 100\]

\[X = 10 \quad \text{so} \quad \frac{x}{5} = \frac{10}{5} = 2\]
If \( \frac{a-b}{b} = \frac{3}{7} \), which of the following must also be true?

If \( b = 7 \), then \( a - b = 3 \)

So \( a - 7 = 3 \)

and \( a = 10 \)

If \( \frac{7}{9}x - \frac{4}{9}x = \frac{13}{4} + \frac{5}{12} \), what is the value of \( x \)?

\[
\frac{7x}{9} - \frac{4x}{9} = \frac{3}{12} + \frac{5}{12}
\]

\[
\frac{7x - 4x}{9} = \frac{3 + 5}{12}
\]

\[
\frac{3x}{9} = \frac{8}{12} = \frac{2.4}{3.4}
\]

\[
\frac{x}{3} = \frac{2}{3}
\]

So, \( x = 2 \)
Like Denominators
\[
\frac{2x+6}{(x+2)^2} - \frac{2(x+2)}{(x+2)(x+a)} = \frac{2x+6 - 2(x+2)}{(x+2)^2} = \frac{2x+6 - 2x-4}{(x+2)^2} = \frac{2}{(x+2)^2}
\]
where \(a\) is a positive constant and \(x \neq -2\).
What is the value of \(a\)?

\[a = -2\]

Polynomial Long Division
The equation \(\frac{24x^2 + 25x - 47}{ax - 2} = -8x - 3 - \frac{53}{ax - 2}\) is true for all values of \(x = \frac{2}{a}\), where \(a\) is a constant.
What is the value of \(a\)?

A) \(-16\)
B) \(-3\)
C) 3
D) 16

So, \(-8(a) = 24\)
\[a = -3\]