Let \( y = \frac{x^2 - x - 12}{x^2 + 10x + 21} \)

a. Identify the domain of \( R(x) \).

b. Identify any holes.

c. Identify any vertical asymptotes.

d. Identify the horizontal asymptote.

e. Identify \( x \)-intercept(s).

f. Identify \( y \)-intercept.
a. Identify the domain of $R(x)$.

b. Identify the range of $R(x)$.

c. Identify any holes.

d. Identify any vertical asymptotes.

e. Identify the horizontal asymptote.

f. Identify $x$-intercept(s).

g. Identify $y$-intercept.
Graph: \[ y = \frac{6}{x + 2} + 3 \]

Be sure to include your asymptotes/holes on the graph.
Simplify and state restrictions on the variable.

\[
\frac{a^2 + 4a - 32}{a^2 - 7a + 12}
\]
Simplify and state restrictions on the variable.

\[
\frac{n^5}{n+2} \cdot \frac{n^2 - 7n - 18}{n^2 - 9n}
\]
Simplify and state restrictions on the variable.

\[
\frac{a^2 - 25}{(a + 5)^2} - \frac{2a - 10}{4a + 20}
\]
Simplify and state restrictions on the variable.

\[
\frac{w^2 - 4w - 21}{w^2 - 9w + 14} - \frac{11}{w - 2}
\]
EGYPT

Simplify and state restrictions on the variable.

\[ \frac{1}{x^2} + \frac{1}{y} \]

\[ \frac{1}{xy} \]
Solve the rational equation and identify any extraneous solution(s).

\[
\frac{x + 5}{x + 4} = \frac{x - 3}{x + 4}
\]
Solve the rational equation and identify any extraneous solution(s).

\[
\frac{2}{x+3} - \frac{3}{4-x} = \frac{2x-2}{x^2-x-12}
\]
Multiply or divide. State any restrictions on the variable.

\[
\frac{c + 3}{c - 4} \div \frac{c + 1}{c^2 - 9c + 20}
\]
Write an equation for the translation of \( y = \frac{1}{x} \) that has an asymptote of \( y = -10 \), a vertical shrink of 1/2 and is reflected over the \( x \)-axis.
Find the horizontal asymptote of the graph of each rational function.

\[ y = \frac{x^3 + 2x - 10x + 2}{x + 9} \]
What is the parent function of $y = \frac{-0.8}{x} - 10$ and explain what translations would occur to the graph.
What is the parent function of \( y = \frac{6}{x + 2} - 4 \) and explain what translations would occur to the graph.
### ROAD BLOCK

a. The horizontal asymptote of

\[ y = \frac{x^3 - 2x^2 + 5x - 9}{x^5 - 4} \]

is \( y = 0 \).

**EXPLAIN** why the answer is \( y = 0 \).
(I do not want a rule … I want to know why the rule works!)

b. Simplify and state restrictions on the variable.

\[ \frac{2x}{x - 7} + \frac{1}{x + 7} - \frac{x^2 + 9x - 15}{x^2 - 49} \]

c. Factor the following: \( x^4 + 11x^2 - 26 \)