[1] Simplify and list restrictions of \( \frac{x^2 - x - 2}{x + 1} \)

[2] Simplify \( \frac{y^2 - 1}{y^2 + 3y + 2} \)

[3] Simplify \( \frac{a - 2}{a^2 - 4} \cdot \frac{a^2 + 4a + 4}{a^2 - 4} \)

[4] Simplify \( \frac{10m^2}{6n^3} \div \frac{5m^7}{4n^7} \)

[5] Simplify \( \frac{2x - 5}{x + 1} - \frac{x + 3}{x + 1} \)

[6] Simplify \( \frac{x}{5x + 10} + \frac{x + 1}{x^2 - 4} \)

[7] Simplify \( \frac{3}{5} + \frac{1}{x} + \frac{2}{x} \)

[8] Mark simplified \( \frac{y^2 - 16}{2y^2 + 5y - 12} \) and came up with an answer of \( \frac{y - 4}{2y - 3} \), with the restriction \( y \neq \frac{3}{2} \). Is there anything wrong with his answer?

The page below has answers! Hide it until you have tried all these problems.
[1] Simplify and list restrictions of \( \frac{x^2 - x - 2}{x + 1} \) with the restriction \( x \neq -1 \)

Factor everything, then cancel.
\[
\frac{a - 2}{a^2 - 4} \cdot \frac{a^2 + 4a + 4}{a^2 - 4} = \frac{(a - 2)(a + 2)}{(a - 2)(a + 2)} \cdot \frac{(a + 2)(a + 2)}{(a - 2)(a + 2)}
\]
\[
\frac{1}{1(a + 2)} \cdot \frac{1(a - 2)}{1(a + 2)} = \frac{1}{a + 2} \cdot \frac{1}{a - 2}
\]

Find a common denominator and multiply.
\[
\frac{x}{5x + 10} + \frac{x + 1}{x^2 - 4}
\]

Find a common denominator first!
\[
\frac{x}{5(x + 2)} + \frac{x + 1}{(x + 2)(x - 2)}
\]

Find a common denominator, then multiply.
\[
\frac{x^2}{x^2} \cdot \frac{3}{5} + \frac{1}{5} \cdot \frac{1}{x + 2}(x - 2)
\]

\[
\frac{3x^2 + 5}{5x^2 + 10x + 5} + \frac{1}{x + 1}
\]

Yes! His work of factoring the numerator (which is a difference of squares) \((y + 4)(y - 4)\) and denominator \((2y - 3)(y + 4)\), then canceling out \((y + 4)\) from each is great. However, when he found restrictions he found only restrictions from the final answer. To find all restrictions, find them before any canceling occurs. He should have included \( y \neq -4 \), taken from the \((x + 4)\) that was canceled in the denominator.