2

Simplify.

\[ \frac{u^2v^2}{u^2-v^2} \]

\[ \frac{\frac{5}{v^2}}{\frac{2}{u^2} - \frac{1}{v}} \]

\[ \frac{u^2v^2}{2v^2 - u^2v} \]

LCD: \( u^2v^2 \)

4

**Polynomial long division: Problem type 3**

Divide.

\[ (-2x^4 + 8x^3 + 3x^2 - 17x + 14) \div (2x^2 - 5) \]

Write your answer in the following form: Quotient + \( \frac{\text{Remainder}}{2x^2 - 5} \).

\[ \frac{-2x^4 + 8x^3 + 3x^2 - 17x + 14}{2x^2 - 5} = \boxed{\text{Quotient}} + \boxed{\frac{\text{Remainder}}{2x^2 - 5}} \]
4. Polynomial long division: Problem type 3

Divide.

\[ (-2x^2 + 10x^4 - 5 + 8x) ÷ (-5x^2 - 4) \]

Write your answer in the following form: Quotient + Remainder

\[ \frac{-2x^2}{-5x^2 - 4} + 2 \]

\[ -5x^2 + 0x - 4 \]

\[ \frac{10x^4 + 0x^3 - 2x^2 + 8x}{-2x^2 + 2} \]

with a remainder of \( 8x + 3 \)

\[ \frac{-2x^2 - 4}{10x^4 + 0x^3 - 2x^2 + 8x - 5} \]

\[ \frac{10x^4}{10x^4 + 0x^3 - 2x^2 + 8x - 5} \]

\[ \frac{-2x^2 + 2}{10x^4 + 0x^3 + 8x^2} \]

\[ \frac{-5x^2 - 9}{-5x^2 - 4} - 9 \]

\[ -2x^2 + 0x - 3 \]

\[ 6x^4 + 9x^3 + 0x^2 - 10x + 19 \]

\[ - \left( 6x^4 - 9x^3 + 9x^2 \right) \]

\[ 18x^3 - 9x^2 - 10x \]

\[ - (18x^3 - 27x^2 + 27x) \]

\[ 18x^2 - 37x + 19 \]

\[ - (18x^2 - 27x + 27) \]

\[ -10x - 8 \]
Using the remainder theorem to evaluate a polynomial

Use the remainder theorem to find \( P(-3) \) for \( P(x) = -x^3 - 4x^2 - x + 4 \).

Specifically, give the quotient and the remainder for the associated division and the value of \( P(-3) \).

\[
x + 3 \bigg| \begin{array}{c}
-3 & -4 & -1 & 4 \\
-3 & -1 & 3 & -6 \\
-1 & -1 & 2 & -2 \\
\end{array}
\]

\( x - 3 \)

8. Solve for \( x \).

\[
\frac{3}{x-4} = \frac{-5}{2x-8} + 1
\]
10. Solve for $x$.

\[
\frac{x}{2x+9} = \frac{3}{x}
\]
12. Solve for \( u \).

\[
\frac{1}{u-2} = -4 + \frac{5}{u+1}
\]

\[
u + 1 = -4(u+1)(u-2) + 5(u-2)
\]

\[
u + 1 = -4(u^2 - 9) + 5u - 10
\]

\[
u + 1 = -4u^2 + 4u + 8 + 5u - 10
\]

\[
u + 1 = -4u^2 + 9u - 2
\]

\[
u = -4u^2 + 9u - 2 - u - 1
\]

\[
u = -4u^2 + 8u - 3
\]

\[-4u^2 + 6u + 2u - 3
\]

\[-2u^2 + (2u - 3) + 1(2u - 3)
\]

\[-2u + 1 = 0
\]

\[2u - 3 = 0
\]

\[2u = -1
\]

\[2u = 3
\]

\[u = -\frac{1}{2}
\]

\[u = 3
\]

14. Solve for \( v \).

\[
\frac{6v^2}{v^2 - 9} = \frac{9}{v-3} + \frac{7v}{v+3}
\]

\[
(9+7v)(v-3) = (v+3)(v-3) + 20v
\]

\[
6v^2 = (v+3)(v-3)
\]

\[
6v^2 = (v^2 - 9) + 20v
\]

\[
6v^2 = 20v - 9
\]

\[
6v^2 = 20v - 9
\]

\[
v^2 - 3v - 9 = 0
\]

\[
(v - 3)(v + 2) = 0
\]

\[
v = 3
\]

\[
v = -2
\]
15. Solve for \( x \).
\[
\frac{20}{x^2 - 6x + 9} = \frac{2x}{x - 3}
\]

\[
\frac{20}{(x-3)^2} = \frac{2x}{x-3}
\]

\[
-20 = 2x(x-3)
\]

\[
-20 = 2x^2 - 6x
\]

\[
x^2 - 3x = 10
\]

\[
x = 5
\]

\[
x = -2
\]

6. An aquarium tank can hold 6000 liters of water. There are two pipes that can be used to fill the tank. The first pipe alone can fill the tank in 55 minutes. The second pipe can fill the tank in 66 minutes by itself. When both pipes are working together, how long does it take them to fill the tank?

\[ x = \text{time to fill} \]

<table>
<thead>
<tr>
<th></th>
<th>time</th>
<th>rate</th>
<th>amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>pipe 1</td>
<td>( x ) min</td>
<td>1 tank</td>
<td>( \frac{x}{55} )</td>
</tr>
<tr>
<td>pipe 2</td>
<td>( x ) min</td>
<td>1 tank</td>
<td>( \frac{x}{66} )</td>
</tr>
</tbody>
</table>

\[
5 \times 6 \times 11 \times \frac{x}{55} + \frac{x}{66} = 1
\]

\[
6x + 5x = 330
\]

\[
11x = 330
\]

\[
x = 30 \text{min}
\]
Week 9

October 28, 2015

10. Dale's boat has a top speed of 9 miles per hour in still water. While traveling on a river at top speed, he went 10 miles upstream in the same amount of time he went 20 miles downstream. Find the rate of the river current.

\[ x = \text{rate of current} \]

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>Rate</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream</td>
<td>( t )</td>
<td>9-x mph</td>
<td>10 mile</td>
</tr>
<tr>
<td>Down</td>
<td>( t )</td>
<td>9+x mph</td>
<td>20 miles</td>
</tr>
</tbody>
</table>

\[ t(9-x) = 10 \]
\[ t = \frac{10}{(9-x)} \]

\[ \frac{10}{(9-x)} \text{ times } (9+x) = 20 \]

\[ \frac{10}{(9-x)} (9+x) = 20 \]

\[ 10(9+x) = 20(9-x) \]

\[ 90 + 10x = 180 - 20x \]

\[ 30x = 90 \]

\[ x = 3 \text{ mph} \]

25. Write the following expression in simplified radical form.

\[ \sqrt[3]{32x^8w^{12}} \]
2. Evaluate.
\[
\frac{1}{81^{\frac{1}{4}}} = -
\]
\[
\frac{1}{27^{\frac{1}{3}}} = -
\]
\[
\frac{\sqrt[4]{81}}{3} = 3\quad 8^{\frac{1}{4}}
\]
\[
\frac{\sqrt[3]{27}}{3} = 3\quad 8^{0.25}
\]

7. Simplify.
\[
\frac{\frac{1}{u}}{\frac{\frac{1}{u^3}}{\frac{1}{u^5}}} = \frac{u^3}{u^2} = u^{3-2} = u
\]
\[
\frac{\sqrt[3]{-3/5}}{-\frac{3}{5}} = u^{\frac{3}{-5}} = u^{-\frac{3}{5}}
\]
\[
\sqrt[4]{\frac{1}{u^{15}}} = \frac{1}{u^{\frac{1}{15}}}
\]
\[ 17 \sqrt{252} = \frac{14}{17} \times \frac{14}{17} = \frac{252}{17} \]