Division

Problem 1 of 6

Question

Find quotient and reminder of dividing $15x^5 + 20x^3 + 6x^2 + 5x + 10$ by $3x^2 + 4$.

Answer

$$
\begin{array}{r|l}
 & 5x^3 + 2 \\
\hline
3x^2 + 4 & \cancel{15x^5} + \cancel{20x^3} + 6x^2 + 5x + 10 \\
 & \underline{-}\cancel{15x^5} \underline{+} \cancel{20x^3} \\
\hline
 & \cancel{6x^2} + 5x + 10 \\
 & \underline{-}\cancel{6x^2} \underline{+} 8 \\
\hline
 & 5x + 2
\end{array}
$$

$$\boxed{\begin{array}{l}\text{Quotient} = 5x^3 + 2 \\ \text{Remainder} = 5x + 2\end{array}}$$

Problem 2 of 6

Question

Find quotient and reminder of dividing $3x^4 + 4x^3 + 12x^2 + 12x + 14$ by $x^2 + 3$.

Answer

$$
\begin{array}{r|l}
 & 3x^2 + 4x + 3 \\
\hline
x^2 + 3 & \cancel{3x^4} + 4x^3 + 12x^2 + 12x + 14 \\
 & \underline{-\cancel{3x^4} \qquad \pm 9x^2} \\
 & \cancel{4x^3} + 3x^2 + 12x + 14 \\
 & \underline{-\cancel{4x^3} \qquad \pm 12x} \\
 & \cancel{3x^2} + 14 \\
 & \underline{-\cancel{3x^2} \qquad \pm 9} \\
 & 5
\end{array}
$$

$$\boxed{\begin{array}{l}\text{Quotient} = 3x^2 + 4x + 3 \\ \text{Remainder} = 5\end{array}}$$

Problem 3 of 6

Question

Find quotient and reminder of dividing $4x^4 + 3x^2 + 12x + 11$ by $4x + 3$.

Answer

$$x^3 - \frac{3x^2}{4} + \frac{21x}{16} + \frac{129}{64}$$

$$4x + 3 \overline{\big)\, \cancel{4x^4} + 3x^2 + 12x + 11}$$

$$\underline{-\cancel{4x^4} - 3x^3}$$

$$-\cancel{3x^3} + 3x^2 + 12x + 11$$

$$\underline{+\cancel{3x^3} + \frac{9x^2}{4}}$$

$$\frac{21x^2}{\cancel{4}} + 12x + 11$$

$$\underline{-\frac{21x^2}{\cancel{4}} - \frac{63x}{16}}$$

$$\frac{129x}{\cancel{16}} + 11$$

$$\underline{-\frac{129x}{\cancel{16}} - \frac{387}{64}}$$

$$\frac{317}{64}$$

$$\text{Quotient} = x^3 - \frac{3x^2}{4} + \frac{21x}{16} + \frac{129}{64}$$

$$\text{Remainder} = \frac{317}{64}$$

Problem 4 of 6

Question

Find quotient and reminder of dividing $4x^4 + 15x^2 - 1$ by $3 + 4x^2$.

Answer

$$
\begin{array}{r|l}
 & x^2 + 3 \\
\hline
4x^2 + 3 & 4x^4 + 15x^2 - 1 \\
 & \underline{-}4x^4 \underline{+} 3x^2 \\
\hline
 & 12x^2 - 1 \\
 & \underline{-}12x^2 \underline{+} 9 \\
\hline
 & -10
\end{array}
$$

$$\boxed{\begin{array}{l}\text{Quotient} = x^2 + 3 \\ \text{Remainder} = -10\end{array}}$$

Problem 5 of 6

Question

Find quotient and reminder of dividing
$2x^4 + 11x^3 + 33x^2 + 77x + 105$ by $x^2 + 5x + 7$.

Answer

$$
\begin{array}{r|l}
 & 2x^2 + x + 14 \\
\hline
x^2 + 5x + 7 & \cancel{2x^4} + 11x^3 + 33x^2 + 77x + 105 \\
 & \underline{\cancel{2x^4} + 10x^3 + 14x^2} \\
 & \cancel{x^3} + 19x^2 + 77x + 105 \\
 & \underline{\cancel{x^3} + 5x^2 + 7x} \\
 & \cancel{14x^2} + \cancel{70x} + 105 \\
 & \underline{\cancel{14x^2} + \cancel{70x} + 98} \\
 & 7
\end{array}
$$

Quotient = $2x^2 + x + 14$
Remainder = 7

Problem 6 of 6

Question

Find quotient and reminder of dividing $x^3 + 14x^2 + 7x + 103$ by $14 + x$.

Answer

$$
\begin{array}{r|l}
 & x^2 + 7 \\
\hline
x + 14 & \cancel{x^3} + \cancel{14x^2} + 7x + 103 \\
 & \underline{\cancel{x^3} + \cancel{14x^2}} \\
 & \qquad\qquad\quad \cancel{7x} + 103 \\
 & \qquad\qquad\quad \underline{\cancel{7x} + 98} \\
 & \qquad\qquad\qquad\quad 5
\end{array}
$$

$$\boxed{\begin{array}{l}\text{Quotient} = x^2 + 7 \\ \text{Remainder} = 5\end{array}}$$