Algebraic Multiplication and Division

Multiplication

$$(x^2 + 3x + 7)(2x^2 - 5x - 3)$$

$$= 2x^4 + 6x^3 + 14x^2$$
$$- 5x^3 - 15x^2 - 35x$$
$$- 3x^2 - 9x - 21$$

$$2x^4 + x^3 - 4x^2 - 44x - 21$$

Division

$3710 \div 14$

1 x 14	14
2 x 14	28
3	42
4	56
5	70
6	84
7	98
8	112
9	126
10	140

$$14 \overline{)3710} = 265$$

28

91

84

70

70

0

Algebraic Division

$$2x^3 + 5x^2 + 8x + 5 \div (x+1)$$

$$
\begin{array}{r|l}
x+1 & 2x^2+3x+5 \\
\hline
 & 2x^3+5x^2+8x+5 \\
 & 2x^3+2x^2 \\
\hline
 & \quad 3x^2+8x \\
 & \quad 3x^2+3x \\
\hline
 & \quad\quad +5x+5 \\
 & \quad\quad +5x+5 \\
\hline
\end{array}
$$

$(x+1)(2x^2+3x+5)$

Ex 2

$2x^4+x^3-4x^2-44x-21 \div (x^2+3x+7)$

$$
\begin{array}{r|l}
x^2+3x+7 & 2x^2-5x-3 \\
\hline
 & 2x^4+x^3-4x^2-44x-21 \\
 & 2x^4+6x^3+14x^2 \\
\hline
 & \quad -5x^3-18x^2-44x \\
 & \quad -5x^3-15x^2-35x \\
\hline
 & \quad\quad -3x^2-9x-21 \\
 & \quad\quad -3x^2-9x-21 \\
\hline
\end{array}
$$

Simplifying Algebraic Fractions

1) $\frac{3}{x+1} - \frac{2}{x-4} = \frac{3(x-4)-2(x+1)}{(x+1)(x-4)}$

$= \frac{3x-12-2x-2}{(x+1)(x-4)}$

$= \frac{x-14}{(x+1)(x-4)}$

2)a) $\frac{(x+3)(x-2)}{(x-2)} = x+3$

2b) $\frac{x^2+3x+2}{x^2+5x+4} = \frac{(x+2)(x+1)}{(x+4)(x+1)} = \frac{x+2}{x+4}$

2c) $\frac{2x^2-5x-3}{2x^2-9x+9} = \frac{(2x+1)(x-3)}{(2x-3)(x-3)}$