

1 Polynomials

1.1 Sums, Differences, and Quotients of Polynomials

► Evaluate

$$\begin{aligned}(3x^2 + 3x) + (8x^2 + 7) \\ (3x^2 + 3x) - (8x^2 + 7) \\ x^2 + x + 5 - 3x^3 + 5x^2 + 4x - 13 + 2x^2 \\ (3x^2 + 3x) / (8x^2 + 7)\end{aligned}$$

1.2 Sums and Differences of Rational Expressions

► Simplify (or Factor)

$$\begin{aligned}\frac{3x^2 + 3x}{8x^2 + 7} + \frac{5x^2 + 3}{2x^2 + x + 7} \\ \frac{(3x^2 + 3x)^3}{2x - 5} - \frac{5x^2 + 3}{2x^2 + x + 7} \\ \frac{3x^2 + 4}{5x^3 - 3x} + \frac{4x + 1}{x^2 - 1}\end{aligned}$$

1.3 Products and Powers of Polynomials

► Expand

$$\begin{aligned}(3x^2 + 3x)(8x^2 + 7) \\ (3x^2 + 3x)^3\end{aligned}$$

1.4 Division by Polynomials

► Polynomials + Divide

$$\begin{aligned}(3x^2 + 3x) / (8x^2 + 7) \\ \frac{3x^5 + 3x^3 - 4x^2 + 5}{8x^2 + 7} \\ \frac{128x^6 + 128x^5 + 128x^4 + 768x^3 - 128x^2 + 128x - 128}{16x^4 + 8x^3 + 70x^2 + 7x + 49}\end{aligned}$$

1.5 Collecting and Ordering Terms

► Polynomials + Sort

$$\begin{aligned}5t^2 + 2t - 16t^5 + t^3 - 2t^2 + 9 \\x^2 + 3x + 5 - 3x^3 + 5x^2 + 4x^3 + 13 + 2x^4 \\5t^2 + 2x - 16t^5 + y^3 - 2t^2 + 9 \\5t^2 + 2x - 16t^5 + y^3 - 2t^2 + 9\end{aligned}$$

1.6 Factoring Polynomials

► Factor

$$\begin{aligned}\frac{1}{2}x^2 + 3x - \frac{20}{9} \\x^2 - y^2 \\x^3 - y^3 \\x^4 - y^4 \\x^3 + y^3 \\x^5 + y^5 \\x^7 + y^7\end{aligned}$$

1.7 Greatest Common Divisor of Two Polynomials

► Evaluate

$$\begin{aligned}\gcd(5x^2 - 5x, 10x - 10) \\ \gcd(yx + 3x - 5y - 15, xz - 53x - 5z + 265) \\ \gcd(x^2 + 3x + yx + 3y, x^2 - 4yx - 5y^2, 3x^2 + 2yx - y^2)\end{aligned}$$

► Factor

$$\begin{aligned}5x^2 - 5x \\ 10x - 10 \\ yx + 3x - 5y - 15 \\ xz - 53x - 5z + 265 \\ x^2 + 3x + yx + 3y \\ x^2 - 4yx - 5y^2 \\ 3x^2 + 2yx - y^2\end{aligned}$$

► Evaluate, Factor

$$\text{lcm}(yx + 3x - 5y - 15, xz - 53x - 5z + 265)$$

1.8 Roots of Polynomials

► Polynomials + Roots

$$\begin{aligned}x^3 - \frac{13}{5}ix^2 - 8x^2 + \frac{29}{5}ix + \frac{81}{5}x + 6i - \frac{18}{5} \\ax^2 + bx + c \\5x^2 + 2x - 3 \\5x^2 + x + 3, \\x^3 + 3x^2 + 3x + 1 \\x^4 + 4x^3 - 12x^2 - 32x + 64 \\x^3 + cx - 1\end{aligned}$$

► Factor

$$\begin{aligned}x^3 + 3x^2 + 3x + 1 \\x^4 + 4x^3 - 12x^2 - 32x + 64 \\x^3 - \frac{3}{2}\sqrt[3]{2}x - 1\end{aligned}$$

► Polynomials + Roots

$$\begin{aligned}x^3 + 3x + 1 \\x^3 + 3x + 1.0\end{aligned}$$

► Evaluate

$$\begin{aligned}(-.322185)^3 + 3(-.322185) + 1.0 \\(-.32218535462608559291)^3 + 3(-.32218535462608559291) + 1\end{aligned}$$

► Polynomials + Roots

$$\begin{aligned}x^4 - 2x - 3 \\x^4 - 2x - 3.0 \\5x^5 + 5x^4 - 10x^3 - 10x^2 + 5x + 5 \\x^8 + x^7 + x^6 + x^5 + x^4 + x^3 + x^2 + x + 1\end{aligned}$$