

2.3 Add, Subtract, and Multiply Polynomials

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Add/Subtract Polynomials

$(2x^3 - 5x^2 + 3x - 9) + (x^3 + 6x^2 + 11)$	Rewrite in vertical format
$ \begin{array}{r} 2x^3 - 5x^2 + 3x - 9 \\ + \quad x^3 + 6x^2 \quad \quad + 11 \\ \hline 3x^3 + x^2 + 3x + 2 \end{array} $	Add

Multiply Polynomials

$(x + 3)(2x^2 - 5x + 4)$	
$ \begin{array}{r} (x + 3)(2x^2 - 5x + 4) \\ 2x^3 - 5x^2 + 4x \end{array} $	Multiply everything by first term
$ \begin{array}{r} (x + 3)(2x^2 - 5x + 4) \\ 2x^3 - 5x^2 + 4x \\ + \quad 6x^2 - 15x + 12 \\ \hline \end{array} $	Multiply everything by second term
$ \begin{array}{r} 2x^3 - 5x^2 + 4x \\ + \quad 6x^2 - 15x + 12 \\ \hline 2x^3 + x^2 - 11x + 12 \end{array} $	Combine like terms

Multiply three binomials

$(x - 5)(x + 1)(x + 3)$	
$ \begin{array}{r} x^2 + x \\ -5x - 5 \\ \hline x^2 - 4x - 5 \end{array} $	FOIL the first two binomials
$(x^2 - 4x - 5)(x + 3)$	Bring down third binomial

$(x^2 - 4x - 5)(x + 3)$ $x^3 + 3x^2$	Multiply by first term
$(x^2 - 4x - 5)(x + 3)$ $x^3 + 3x^2$ $-4x^2 - 12x$	Multiply by second term
$(x^2 - 4x - 5)(x + 3)$ $x^3 + 3x^2$ $-4x^2 - 12x$ $-5x - 15$	Multiply by third term
$(x^2 - 4x - 5)(x + 3)$ $x^3 + 3x^2$ $-4x^2 - 12x$ $+ \quad \quad -5x - 15$ $x^3 - x^2 - 17x - 15$	Combine Like Terms