

Synthetic Division

- Easier method but with a catch.

Can only be used when the DIVISOR is LINEAR

Divisor must be of the form $(x-a)$ NO COEFFICIENT IN FRONT OF x !! ★

Example # 1

Divide $4x^3 + 3x^2 - 5x + 2$ by $(x+1)$

Take coefficients of the dividend

$$\begin{array}{r|rrrr} -1 & 4 & 3 & -5 & 2 \\ & \downarrow & -4 & 1 & 4 \\ \hline & 4 & -1 & -4 & 6 \end{array}$$

quadratic term linear term constant term remainder

$$= 4x^2 - x - 4 + \frac{6}{x+1}$$

Example # 2

Divide $x^4 - 2x^3 + 3x + 1$ by $(x-3)$

$$\begin{array}{r|rrrrr} 3 & 1 & -2 & 0 & 3 & 1 \\ & \downarrow & 3 & 3 & 9 & 36 \\ \hline & 1 & 1 & 3 & 12 & 37 \end{array}$$

$$= x^3 + x^2 + 3x + 12 + \frac{37}{x-3}$$

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