

Algebra II

8-4

Synthetic Division

Divide using synthetic division.

$$1) \frac{3x^3 - 5x^2 + x - 2}{x - 2}$$

use the coefficients for the top row
 $\begin{array}{r|rrrr} & 3 & -5 & 1 & -2 \\ & \downarrow & \nearrow 6 & \nearrow 2 & \nearrow 6 \\ 2 & 3 & 1 & 3 & 4 \end{array}$

use the opposite 2

← Remainder

$$\boxed{3x^2 + 1x + 3 + \frac{4}{x-2}}$$

- Steps: 1) Bring down the first number (3)
 2) Multiply by the number out front (3)(2)
 3) Add this result (6) in the next column.
 Repeat steps 2 and 3 until finished

Power in the answer is one power less than the original problem.

$$11) \frac{2x^4 + x^3 - x - 2}{x + 1}$$

Don't forget the zero in the x^2 spot.

$$\begin{array}{r|rrrrr} & 2 & 1 & 0 & -1 & -2 \\ -1 & \nearrow -2 & \nearrow 1 & \nearrow -1 & \nearrow 2 & \\ 2 & -1 & 1 & -2 & 0 & \end{array}$$

$$\boxed{2x^3 - x^2 + x - 2}$$

(from yesterday's assignment)

$$26) \frac{x^5 - a^5}{x - a}$$

$$\begin{array}{r|rrrrrr} & 1 & 0 & 0 & 0 & 0 & -a^5 \\ a & \nearrow a & \nearrow a^2 & \nearrow a^3 & \nearrow a^4 & \nearrow a^5 & \\ a & 1 & a & a^2 & a^3 & a^4 & 0 \end{array}$$

$$\boxed{x^4 + ax^3 + a^2x^2 + a^3x + a^4}$$

$$17) \frac{z^3 - 2z^2 + 4z - 5}{z - 2i}$$

$$\begin{array}{r|rrrr} & 1 & -2 & 4 & -5 \\ 2i & \nearrow 2i & \nearrow -4 - 4i & \nearrow 8 & \\ 2i & (-2+2i) & -4i & 3 & \end{array}$$

$$z^2 + (-2+2i)z - 4i + \frac{3}{z-2i}$$

Find the polynomial $Q(x)$ and the constant R .

$$19) \frac{2x^3 + 5x^2 + 4}{(x+3)^2} = Q(x) + R$$

Dividend Divisor Quotient Remainder

$$\begin{array}{r|rrrr} & 2 & 5 & 0 & 4 \\ -3 & \nearrow -6 & \nearrow 3 & \nearrow -9 & \\ 2 & -1 & 3 & -5 & \end{array}$$

dividend divisor quotient remainder

$$Q(x) = 2x^2 - x + 3$$

$$R = -5$$

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