

September 20

More Synthetic Division

Before starting division, the polynomial you are dividing must be in order and have every term.

Ex1 $(x^4 + 4x^3 + 36x - 4x^2 - 45) \div (x-3)$

$$(x^4 + 4x^3 - 4x^2 + 36x - 45) \div (x-3)$$

$$\begin{array}{r|l} x-3=0 & \\ +3 & +3 \\ \hline x \neq 3 & \end{array}$$

$$\begin{array}{r|rrrrr} 3 & 1 & 4 & -4 & 36 & -45 \\ & & 0 & 3 & 21 & 51 \\ \hline & 1 & 7 & 17 & 87 & 216 \leftarrow R \end{array}$$
$$x^3 + 7x^2 + 17x + 87 + \frac{216}{x-3}$$

$$\boxed{x^3 + 7x^2 + 17x + 87 + \frac{216}{x-3}}$$

Ex2 $(10h^3 + 4h^2 - 26) \div (h+2)$

$$(10h^3 + 4h^2 + 0h - 26) \div (h+2)$$

$$\begin{array}{r|l} h+2=0 & \\ -2 & -2 \\ \hline h \neq -2 & \end{array}$$

$$\begin{array}{r|rrrr} -2 & 10 & 4 & 0 & -26 \\ & & 0 & -20 & 32 \\ \hline & 10 & -16 & 32 & -90 \leftarrow R \end{array}$$

$$\boxed{10h^2 - 16h + 32 - \frac{90}{h+2}}$$

Ex3 $(-9r^2 + 18r + 9r^5 - 18r^4 + 8) \div (r-2)$

$(9r^5 - 18r^4 + 0r^3 - 9r^2 + 18r + 8) \div (r-2)$

$$\begin{array}{r|l} r-2 & \neq 0 \\ +2 & +2 \\ \hline & r \neq 2 \end{array}$$

$$\begin{array}{r} 2 \overline{) 9 \quad -18 \quad 0 \quad -9 \quad 18 \quad 8} \\ \underline{0 \quad 18 \quad 0 \quad 0 \quad -18 \quad 0} \\ 9 \quad 0 \quad 0 \quad -9 \quad 0 \quad \textcircled{8} \leftarrow R \end{array}$$

$$9r^4 + \cancel{0r^3} + \cancel{0r^2} - 9r + \cancel{0} + \frac{8}{r-2}$$

$$\boxed{9r^4 - 9r + \frac{8}{r-2}}$$