

4.3 Division

Ex: $\frac{x^2 - 5x - 6}{x - 6} = \frac{(x-6)(x+1)}{x-6} = x+1$

Ex:
$$\begin{array}{r} 24 \frac{1}{3} \\ 3 \overline{) 73} \\ \underline{-6} \\ 13 \\ \underline{-12} \\ 1 \end{array}$$

$$\begin{array}{r} x+1 \\ x-6 \overline{) x^2 - 5x - 6} \\ \underline{-x^2 + 6x} \\ 11x - 6 \\ \underline{-11x + 66} \\ 60 \end{array}$$

Ex:
$$\frac{3x^4 - 5x^2 + 1}{x-1}$$

Long Division

$$\begin{array}{r} 3x^3 + 3x^2 - 2x - 2 + \frac{-1}{x-1} \\ x-1 \overline{) 3x^4 + 0x^3 - 5x^2 + 0x + 1} \\ \underline{-3x^4 + 3x^3} \\ 3x^3 - 5x^2 \\ \underline{-3x^3 + 3x^2} \\ -2x^2 + 0x \\ \underline{+2x^2 - 2x} \\ -2x + 1 \\ \underline{+2x - 2} \\ -1 \end{array}$$

Synthetic Division

$$\frac{3x^4 - 5x^2 + 1}{x-1}$$

$x-1=0$
 $x=1$

1	3	0	-5	0	1
	3	3	-2	-2	
	3	3	-2	-2	-1

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+ x

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

$$\frac{x^3 - 8x + 2}{x + 2}$$

$$\begin{array}{r|rrrr} -2 & 1 & 0 & -8 & 2 \\ & & -2 & 4 & 8 \\ \hline & 1 & -2 & -4 & 10 \end{array}$$

$$\begin{aligned} x + 2 &= 0 \\ x &= -2 \end{aligned}$$

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+ x

$$\boxed{\begin{array}{r} x^2 - 2x - 4 + 10 \\ \hline x + 2 \end{array}}$$

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