4.3 Division

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

Ex: $3\overline{)73}$

$24\frac{1}{3}$

$-6\downarrow$

13

-12

1

$(x-6)\overline{)x^2-5x-6}$

$x+1$

$-x^2+6x\downarrow$

$x-6$

$-x+6$

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

Long Division

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

$(x-1)\overline{)3x^4+0x^3-5x^2+0x+1}$

$-3x^4+3x^3\downarrow$

$3x^3-5x^2$

$-3x^3+3x^2\downarrow$

$-2x^2+0x$

$+2x^2-2x\downarrow$

$-2x+1$

$+2x-2$

-1

Synthetic Division

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

$x-1=0$

$x=1$

$1\,|\,3\ 0\ -5\ 0\ 1$

$\quad\ \ 3\ \ 3\ -2\ -2$

$3\ \ 3\ -2\ -2\ \ -1$ ← remainder

$+\ \times$

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

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

$x + 2 = 0$

$x = -2$

-2	1	0	-8	2
		-2	4	8
	1	-2	-4	10

10 ↑ R

$+ \quad \times$

$$x^2 - 2x - 4 + \frac{10}{x+2}$$