5.4 Synthetic Division

$x\overline{)2x^3}$

only works when $\div (x \pm \#)$

① $(2x^3+13x^2+16x+5) \div (x+5)$

$$\begin{array}{r|cccc} -5 & 2 & 13 & 16 & 5 \\ & \downarrow & -10 & -15 & -5 \\ \hline & 2 & 3 & 1 & 0 \end{array}$$

$-5(2)$

$-5(3)$

0 → remainder

$2x^2+3x+1$

(2) $\dfrac{x^4 - 3x^2 + 7x - 1}{x - 2}$

2	1	0	−3	7	−1
	↓	2	4	2	18
	1	2	1	9	17

$1x^3 + 2x^2 + 1x + 9$

17 ↓ remainder

(3) Is $(x+a)$ a factor of $f(x)$?

Factor Theorem

$x+a$ is a factor if $f(-a)=0$

5.4 Synthetic Division

Only works if $\div (x \pm \#)$

① $(x^3 - 8x^2 + 17x - 10) \div (x-5)$

5.1

5(-3)

5	1	-8	17	-10
		5	-15	10
	1	-3	2	0 ← remainder

$1x^2 - 3x + 2$

② $\dfrac{2x^3 - 4x + 5}{x + 3}$

-3	2	0	-4	5
		-6	18	-42
	2	-6	14	-37 → Remainder

$2x^2 - 6x + 14 \quad R\ -37$

③ $(x^4+3x-2) \div (x^1-4)$

4	1	0	0	3	−2
	↓	4	16	64	268
	1	4	16	67	266
					↓
	$1x^3+4x^2+16x+67$				R

④ Factor Theorem

a is an x-intercept

$f(a) = 0$

$(x - a)$

Is $(x+3)$ a factor of $f(x)$?

check $f(-3) = 0$