3.2 Remainder Theorem

$\frac{x^3}{x} \Rightarrow x^2$

ex) Divide x^3+2x^2-5x-6 by $x+2$.

-2 | 1 2 −5 −6
↓ −2 0 10
1 0 −5 (4)

x^2-5 R=4

Try subbing $x=-2$ into $P(x)$.

$(-2)^3+2(-2)^2-5(-2)-6=4$

$-8+8+10-6$

Try subbing $x=2$ into $P(x)$.

$(2)^3+2(2)^2-5(2)-6=0$

This means $P(x)\div(x-2)$ has a remainder of 0.

2 | 1 2 −5 −6
↓ 2 8 6
1 4 3 0

$(x-2)(x^2+4x+3)$

$(x-2)(x+3)(x+1)$

Remainder Theorem

When $P(x)$ is divided by $x-a$, the remainder is $P(a)$.

ex) What's the remainder of $\frac{x^3-10x+6}{x+4}$?

$$-4 \left[\begin{array}{cccc} 1 & 0 & -10 & 6 \\ & -4 & 16 & -24 \\ \hline 1 & -4 & 6 & -18 \end{array}\right]$$

$(-4)^3-10(-4)+6=-18$

Read Key Ideas pg. 123

pg 124-125 #1-5 Long & Synth. Div.

#6-7 Rem. Thm.

#8-11, 14-16