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3.2: Dividing Polys

(1) Long Division

ex1: $(3x^2+5x-4) \div (x+3)$

ex2: $(x^4-x^3+4x+2) \div (x^2+3)$

(2) Synthetic Division

ex3: $(x^2+4x-8) \div (x+3)$

(work w/ long & synthetic Division)

ex4: $\dfrac{x^4-x^3+x^2-x+2}{x-2}$

(3) The remainder & factor Thms.

ex5: If $P(x) = x^4-x^3+x^2-x+2$, find $P(2)$.

note the remainder in (ex 4).

Remainder Thm: If $P(x)$, a poly, is divided by $x-c$, then the remainder $R = P(c)$.

why? $P(x) = (x-c)P(x) + R \Rightarrow P(c) = R$

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Factor Thm: c is a zero of P iff $(x-c)$ is a factor of $P(x)$.

□ proof.

(1) Assume c is a zero

(2) Assume $(x-c)$ is a factor.

ex6: Factor $P(x) = x^3 - 3x^2 + 3x - 1$ by 1st evaluating $P(1)$

ex7: same as ex 6 if $P(x) = x^4 + 3x^3 - 16x^2 - 27x + 63$ given zeros @ $c = \pm 3$.