Dividing Polynomials &

The Remainder Theorem

1/22

Dividing Polynomials

- When dividing a polynomial by a monomial, divide each term in the polynomial by the monomial

- Ex. $\dfrac{4x^3y^2+8xy^2-12x^2y^3}{4xy}$

$\dfrac{4x^3y^2}{4xy} + \dfrac{8xy^2}{4xy} - \dfrac{12x^2y^3}{4xy}$

$x^2y + 2y - 3xy^2$

Dividing Polynomials

- When dividing a polynomial by a polynomial, use long division (called division algorithm)
- Ex.

$(x^2+2x-24)\div(x-4)$

Dividend ÷ Divisor

Quotient

Divisor ⟌ Dividend

$(t^2+3t-9)(5-t)^{-1}$

$\frac{t^2+3t-9}{5-t}$

$$\begin{array}{r} x+6 \\ x-4\overline{)\,x^2+2x-24} \\ -x^2+4x \\ \hline 6x-24 \\ -6x+24 \\ \hline 0 \end{array}$$

① Dividend & Divisor are in Standard form & have all terms

$(0x^2+x^3+x+5)$

x^3+0x^2+x+5

② what times the 1st term in the divisor equals the 1st term in the dividend?

③ Multiply

④ Change the signs & collect like terms

⑤ Bring down the next term & repeat steps 2-5 until finished.

More Dividing

$$\left(a^2-5a+3\right)\left(2-a\right)^{-1}$$

* $$\frac{\left(5x^3-13x^2+10x-8\right)}{\left(x-2\right)}$$

$$\begin{array}{r} 5x^2-3x+4 \\ x-2 \overline{)\,5x^3-13x^2+10x-8} \\ -5x^3+10x^2 \\ \hline -3x^2+10x \\ +3x^2-6x \\ \hline 4x-8 \\ -4x+8 \\ \hline 0 \end{array}$$

Dividing

$(4y^4 - 5y^2 + 2y + 4) \div (2y - 1)$

$(3m^5 + m - 1) \div (m + 1)$

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

$m+1 \overline{)\, 3m^5 + 0m^4 + 0m^3 + 0m^2 + m - 1}$

$-3m^5 + 3m^4$

$-3m^4 + 0m^3$

$+3m^4 + 3m^3$

$3m^3 + 0m^2$

$-3m^3 - 3m^2$

$-3m^2 + m$

$+3m^2 + 3m$

$4m - 1$

$-4m + 4$

-5

Dividing, one more

$$\left(6x^4+15x^3-28x-6\right)\div\left(x+2\right)$$

$6x^3+3x^2-6x-16+\frac{26}{x+2}$

$x+2\overline{)\,6x^4+15x^3+0x^2-28x-6}$

$6x^4+12x^3$

$3x^3+0x^2$

$-3x^3+6x^2$

$-6x^2-28x$

$+6x^2+12x$

$-16x-6$

$-16x+32$

26