

# 2.4 (part 1) | Dividing Polynomials w/ Long Division

$\frac{22}{7}$  ← dividend  
 $\frac{22}{7}$  ← divisor  
 $\frac{3}{1}$  ← quotient  
 $7 \overline{) 22}$   
 $\underline{-21}$   
 $1$  ← remainder

ex 1)  $(x^2 + 14x + 45) \div (x + 9)$

$\frac{x^2}{x} = (x)$   
 $\frac{5x}{x} = (5)$   
 $x + 9 \overline{) x^2 + 14x + 45}$   
 $\underline{(-) x^2 + 9x}$   
 $5x + 45$   
 $\underline{(-) 5x + 45}$   
 $0$

$q(x) \rightarrow$  quotient  
 $\rightarrow$  depressed polynomial  
 $r(x) \rightarrow$  remainder

$x^2 + 14x + 45$   
 $(x + 5)(x + 9)$   
 $\rightarrow$  ac or guess'n'check

$\frac{2x^3}{x} = (2x^2)$   
 $\frac{3x^2}{x} = (3x)$   
 $\frac{-2x}{x} = (-2)$   
 $x - 3 \overline{) 2x^3 - 3x^2 - 11x + 7}$   
 $\underline{(-) 2x^3 - 6x^2}$   
 $3x^2 - 11x$   
 $\underline{(-) 3x^2 - 9x}$   
 $-2x + 7$   
 $\underline{(-) -2x + 6}$   
 $1$

$q(x) \rightarrow 2x^2 + 3x - 2$   
 $r(x) \rightarrow 1$

ex 3)  $(2x^4 + 3x^3 - 7x - 10) \div (x^2 - 2x)$

$\frac{2x^4}{x^2} = (2x^2)$   
 $\frac{-7x^3}{x^2} = (-7x)$   
 $\frac{14x^2}{x^2} = (14)$   
 $\frac{21x - 10}{x^2 - 2x}$

Place holder  
 $x^2 - 2x \overline{) 2x^4 + 3x^3 + 0x^2 - 7x - 10}$   
 $\underline{(-) 2x^4 - 4x^3}$   
 $7x^3 + 0x^2$   
 $\underline{(-) 7x^3 - 14x^2}$   
 $14x^2 - 7x$   
 $\underline{(-) 14x^2 - 28x}$   
 $21x - 10$

$q(x) \rightarrow 2x^2 + 7x + 14$   
 $r(x) \rightarrow 21x - 10$

ex 4)  $(6x^3 - 2) \div (3x - 1)$

$2x^2 + \frac{2}{3}x + \frac{2}{9}$   $q(x)$

$3x-1 \overline{) 6x^3 + 0x^2 + 0x - 2}$

$\hookrightarrow 6x^3 - 2x^2$

$2x^2 + 0x$

$\hookrightarrow 2x^2 - \frac{2}{3}x$

$\frac{2}{3}x - 2$

$\hookrightarrow \frac{2}{3}x - \frac{2}{9}$

$-\frac{16}{9}$   $r(x)$

$2x^2 + \frac{2}{3}x + \frac{2}{9} + \frac{-16}{9}$   
 $\frac{\quad\quad\quad}{3x-1}$

HW: p324, #2-16 even

$\frac{2x^2}{3x} = \left(\frac{2}{3}x\right)$

$\frac{\frac{2}{3}x}{3x} \quad \frac{\frac{2}{3} \div 3}{\frac{2}{3} \cdot \frac{1}{3}} = \left(\frac{2}{9}\right)$