Notes 3.3 – Polynomial Operations

Warmup – Distributive Property

1. $2x(5x^2 + 7)$

$10x^3 + 14x$

2. $9x(-x^2 - 3)$

$-9x^3 - 27x$

3. $5x^2(x^4 + 6x^3)$

$5x^6 + 30x^5$

4. $-x(x^2 - x + 1)$

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

5. $-3x^2(-2x^2 + x - 1)$

$6x^4 - 3x^3 + 3x^2$

6. $-1(x^2 - 4x + 8)$

$-x^2 + 4x - 8$

Investigation

Recall that 132 means $100 + 30 + 2$

a. Thinking of how you add regular numbers (without a calculator), how might you add these polynomials?

$1x^3 + 2x^2 + 5x + 1$ and $4x^2 + 3x + 6$

$$x^3 + 2x^2 + 5x + 1$$
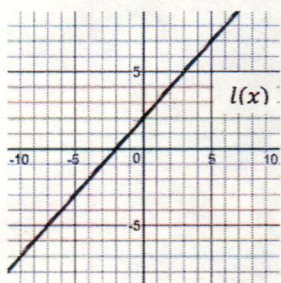$$+ \quad 4x^2 + 3x + 6$$
$$\overline{x^3 + 6x^2 + 8x + 7}$$

b. Use the polynomials below to find the indicated sums.
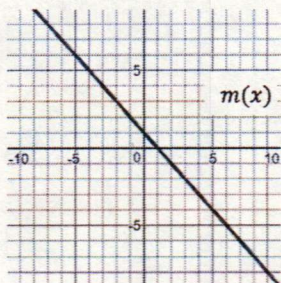
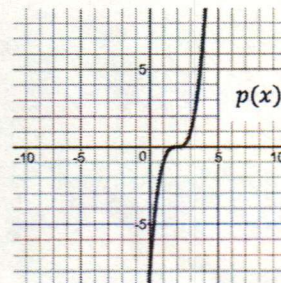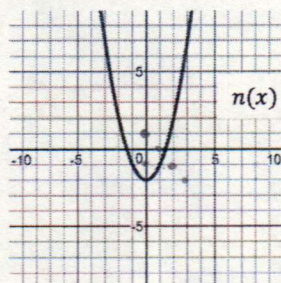$f(x) = x^3 + 3x^2 - 2x + 10$ 　　　　$g(x) = 2x - 1$

$h(x) = 2x^2 + 5x - 12$ 　　　　　　$k(x) = -x^2 - 3x + 4$

$l(x)$　　$m(x)$　　$n(x)$　　$p(x)$
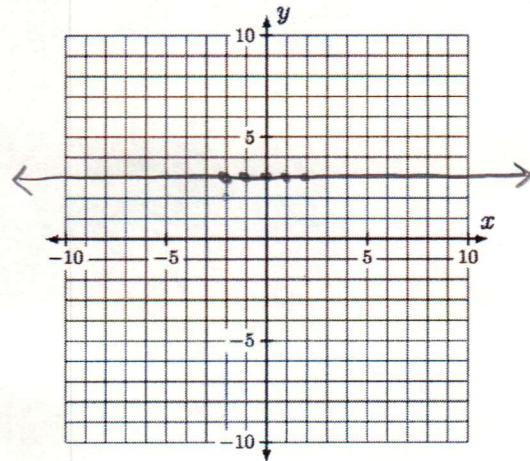
$h(x) + k(x)$

$$\underline{x^2 + 2x - 8}$$
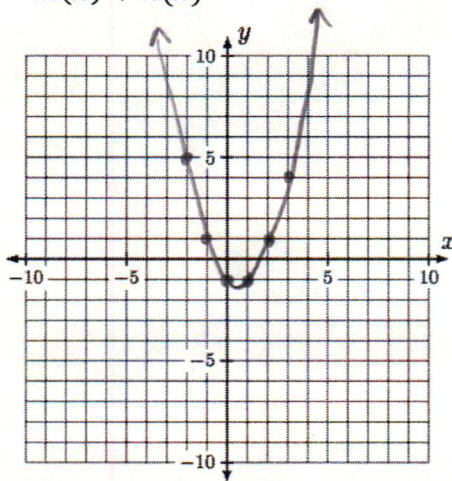
$f(x) + k(x)$

$$\underline{x^3 + 2x^2 - 5x + 14}$$

$g(x) + f(x)$

$$\underline{x^3 + 3x^2 + 9}$$
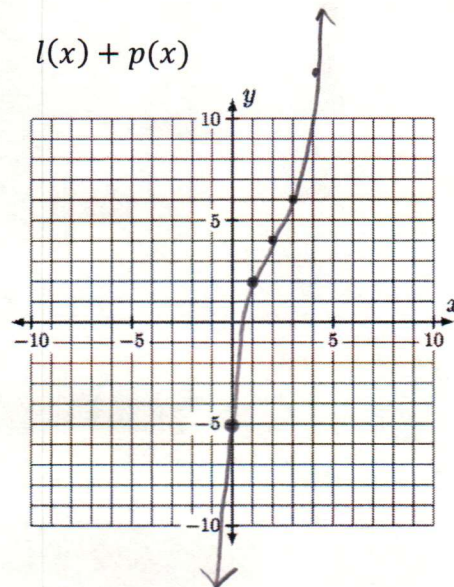
$l(x) + m(x)$

$m(x) + n(x)$

$l(x) + p(x)$

d.　How do you think subtracting polynomials is different from adding?

Same process, but subtracting
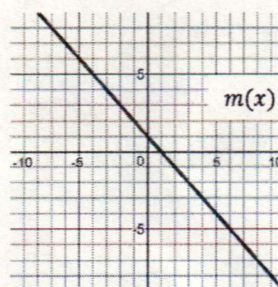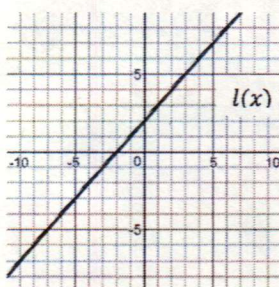
e.　Use the polynomials below to find the indicated differences.

$f(x) = x^3 + 2x^2 - 7x - 8$　　　　$g(x) = -4x - 7$

$h(x) = 4x^2 - x - 15$　　　　$k(x) = -x^2 + 7x + 4$

$l(x)$

$m(x)$

Adding Work

$h(x) + k(x)$

$$\begin{array}{r} 2x^2 + 5x - 12 \\ +\ \underline{-x^2 - 3x + 4} \\ x^2 + 2x - 8 \end{array}$$

$f(x) + k(x)$

$$\begin{array}{r} x^3 + 3x^2 - 2x + 10 \\ +\ \underline{-x^2 - 3x + 4} \\ x^3 + 2x^2 - 5x + 14 \end{array}$$

$g(x) + f(x)$

$$\begin{array}{r} 2x - 1 \\ +\ \underline{x^3 + 3x^2 - 2x + 10} \\ x^3 + 3x^2 + 0x + 9 \end{array}$$

$L(x) + m(x)$

$x = -2 \quad 0 + 3 = 3$
$x = -1 \quad 1 + 2 = 3$
$x = 0 \quad 2 + 1 = 3$
$x = 1 \quad 3 + 0 = 3$
$x = 2 \quad 4 + -1 = 3$

$m(x) + n(x)$

$x = 0 \quad 1 + (-2) = -1$
$x = 1 \quad 0 + (-1) = -1$
$x = 2 \quad -1 + (2) = 1$
$x = 3 \quad -2 + 6 = 4$
$x = -1 \quad 2 + (-1) = 1$
$x = -2 \quad 3 + (2) = 5$

$L(x) + p(x)$

$x = 0 \quad 2 + (-7) = -5$
$x = 1 \quad 3 + (-1) = 2$
$x = 2 \quad 4 + 0 = 4$
$x = 3 \quad 5 + 1 = 6$
$x = 4 \quad 6 + 7 = 13$
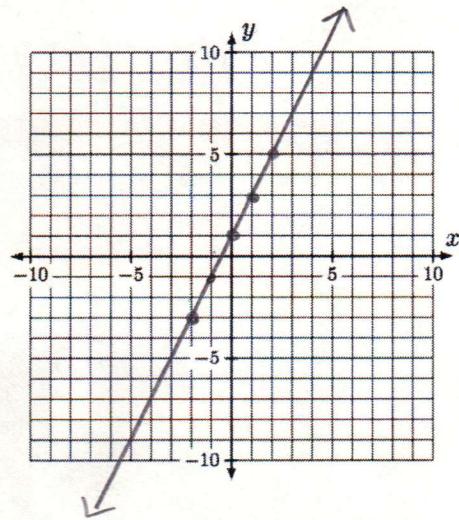
$h(x) - k(x)$

$$5x^2 - 8x - 19$$

$f(x) - h(x)$

$$x^3 - 2x^2 - 6x + 7$$

$f(x) - g(x)$

$$x^3 + 2x^2 - 3x - 1$$

$k(x) - f(x)$

$$-x^3 - 3x^2 + 14x + 12$$

$l(x) - m(x)$

f.   What is it important to remember when subtracting polynomials?

watch signs!

Vocabulary

Word	Meaning/Notation	Example
Standard Form	writing a polynomial so exponents are in descending order	$x^3 + x^2 + x + 1$

Subtracting Work

$h(x) - k(x)$

$$4x^2 - x - 15$$
$$- \underline{\quad -x^2 + 7x + 4 \quad}$$
$$5x^2 - 8x - 19$$

$f(x) - h(x)$

$$x^3 + 2x^2 - 7x - 8$$
$$- \underline{\quad 4x^2 - x - 15 \quad}$$
$$x^3 - 2x^2 - 6x + 7$$

$f(x) - g(x)$

$$x^3 + 2x^2 - 7x - 8$$
$$- \underline{\quad\quad\quad -4x - 7 \quad}$$
$$x^3 + 2x^2 - 3x - 1$$

$k(x) - f(x)$

$$-x^2 + 7x + 4$$
$$- \underline{\quad x^3 + 2x^2 - 7x - 8 \quad}$$
$$-x^3 - 3x^2 + 14x + 12$$

$l(x) - m(x)$

$x = -2 \qquad 0 - 3 = -3$
$x = -1 \qquad 1 - 2 = -1$
$x = 0 \qquad 2 - 1 = 1$
$x = 1 \qquad 3 - 0 = 3$
$x = 2 \qquad 4 - (-1) = 5$