Bellwork: Simplify the polynomial

$$3x(7x^2 - 4x + 9) - (2x+5) + x(x^3 - x)$$

$$\cancel{21x^3} - \cancel{12x^2} + \cancel{27x} - \cancel{2x} - 5 + \cancel{x^4} - \cancel{x^2}$$

$$x^4 + 21x^3 - 13x^2 + 25x - 5$$

Homework 1.1 Solutions

Simplify each sum.

1) $(5k - 8k^3 - 5k^4) + (2k^4 - 5k^3 - 4)$

$-3k^4 - 13k^3 + 5k - 4$

2) $(3n - 6n^2 + 8) + (3n^2 - 2 + 4n^4)$

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

3) $(8n^2 + 2 + 2n) + (6n - 8 - 5n^2) + (2n + 6n^2)$

$9n^2 + 10n - 6$

4) $(6 + x^2 - 5x) + (7x^3 + 3x^4 + 4) + (2x^2 + 4x^3)$

$3x^4 + 11x^3 + 3x^2 - 5x + 10$

Simplify each difference.

5) $(x^2 + 4x^3 + 6x) - (x^3 - 3x - 7x^2 + 7x^4)$

$-7x^4 + 3x^3 + 8x^2 + 9x$

6) $(m^3 + m^4 + 8m^2) - (4m^2 - 7m^3 - 4m^4 + 2)$

$5m^4 + 8m^3 + 4m^2 - 2$

Simplify each expression.

7) $(7m^2 - 4m^3 - 6m) - (4m + m^2 - 4) + (5m - 3m^2)$

$-4m^3 + 3m^2 - 5m + 4$

8) $(3p^2 + 4 + 3p^4) + (6p^4 + 3 + p) + (1 + 4p^4)$

$13p^4 + 3p^2 + p + 8$

Find each product.

9) $(3n + 2)(7n^2 - 2n - 1)$

$21n^3 + 8n^2 - 7n - 2$

10) $(3n + 1)(8n^2 + 6n - 1)$

$24n^3 + 26n^2 + 3n - 1$

11) $(7n + 4)(7n^2 - n + 5)$

$49n^3 + 21n^2 + 31n + 20$

12) $(6x - 1)(x^2 + 7x + 6)$

$6x^3 + 41x^2 + 29x - 6$

13) $(3b^2 - b + 6)(b^2 + 8b - 6)$

$3b^4 + 23b^3 - 20b^2 + 54b - 36$

14) $(8x^2 + x - 3)(5x^2 - 6x - 7)$

$40x^4 - 43x^3 - 77x^2 + 11x + 21$

15. Find the perimeter and area of the rectangle shown below in terms of x.

$2x + 3$

$x^2 + 2x - 1$

Perimeter = $2x^2 + 8x + 4$

Area = $2x^3 + 7x^2 + 4x - 3$

16. Refer to your answer for #13 above.

A) How many terms does it have? 5

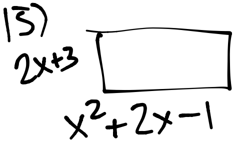
B) What is the degree of the polynomial? 4

C) What is the coefficient of the 2nd term? 23

★17. Simplify. $10x - (2x^2 - x)(5x + 6) + 2(x^3 - 8)$

$-8x^3 - 7x^2 + 16x - 16$

15)



$P = 2(2x+3)+2(x^2+2x-1)$

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

$$\boxed{P = 2x^2+8x+4}$$

$A = bh = (x^2+2x-1)(2x+3)$

	x^2	$+2x$	-1
$2x$	$2x^3$	$4x^2$	$-2x$
$+3$	$3x^2$	$6x$	-3

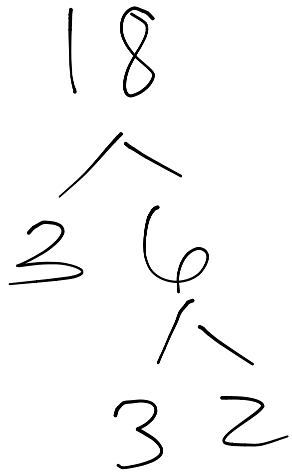
$$\boxed{A = 2x^3+7x^2+4x-3}$$

Today's Objectives:

I can factor polynomials with a leading coefficient of one.

I can apply the Remainder Theorem to determine the factors of a polynomial.

What are factors?



Factoring Polynomials Review

$x^2 + bx + c$

In a quadratic of the form ax^2+bx+c, when $a=1$, we find two numbers p and q, where $p+q=b$ and $pq=c$. $(x+p)(x+q)$ will be the factored form of ax^2+bx+c.

$(x \quad)(x \quad)$

Example 4:

Factor: $f(x)=x^2-5x+6$

$(x-2)(x-3)$

$$\begin{array}{ccc} & 6 & \\ -2 & \times & -3 \\ & + & \\ & -5 & \end{array}$$

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

$=x^2-5x+6$

~~6 -1~~

~~-6 1~~

Example 5:

Factor: $f(x)=x^2+6x+9$

$(x+3)(x+3)$

$\boxed{(x+3)^2}$

9 → 3, 3

6 → 2, 3

9

x

3 3

+

6

Example 6:

Factor: $f(x)=x^2+8x-20$

$$\boxed{(x-2)(x+10)}$$

$-4 \quad 5$

$2 \quad 10$

-20

$\times$

$-2 \qquad 10$

$+$

$+8$

$x=2$

$$2^2+8(2)-20$$

$$4+16-20=0$$

Remainder Theorem

For a polynomial $p(x)$ and a number a, the remainder when dividing by $x-a$ is $p(a)$, so $p(a)=0$ if and only if $x-a$ is a factor of $p(x)$.

x-a is a factor of p(x) if and only if p(a)=0

Example 1:

Is $x+5$ a factor of $f(x)=3x^2+14x-5$?

$x=-5$ $\quad$ $f(-5)=3(-5)^2+14(-5)-5$

$3(25)-70-5$

$75-75=\boxed{0}$

YES!

Example 2:

Is $x-3$ a factor of $f(x)=2x^2-7x-4$?

$x=3 \quad f(3)=2(3)^2-7(3)-4$

$18-21-4=-7$

PEMDAS

NO!

Example 3:

Is $x+2$ a factor of $f(x)=x^3-3x^2-6x+8$?

$F(-2)=(-2)^3-3(-2)^2-6(-2)+8=$ $\boxed{\text{yes}}$

$-8-12+12+8=0$

$$x^2 + 4x + 0$$

$$(x+0)(x+4)$$

$$x(x+4)$$

0

$0 \quad 4$

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