Daily Agenda

Learning Target:
I can divide polynomials using long and synthetic division.

Homework

Go Trick or Treating

Assessments

4.1 to 4.4 Quiz 11/4
Unit 4 Test 11/14

The best way to cheer yourself up is to try to cheer somebody els
-Mark Twain

Nov 15-8:24 PM

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16) $2x^2 + xy - 3y^2$

$(2x + 3y)(x - y)$

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

Oct 31-11:05 AM

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15) $1 - 27x^3$

$(1 - 3x)(1 + 3x + 9x^2)$

$1 + 3x + 9x^2 - 3x - 9x^2 - 27x^3$

$1 - 27x^3$

Oct 31-11:06 AM

4.3 Long Division with Polynomials
Warmup

Divide by hand $38256 \div 4$

$$\begin{array}{r} 9564 \\ 4\overline{)38256} \\ -36 \\ \hline 22 \\ -20 \\ \hline 25 \\ -24 \\ \hline 16 \\ -16 \\ \hline 0 \end{array}$$

Sep 15-10:27 PM

We use the same process with polynomials.

$(x^3 - 2x^2 - 3x + 12) \div (x+2)$

$$x+2\overline{)x^3 - 2x^2 - 3x + 12} \quad x^2 - 4x + 5 + \frac{2}{x+2}$$
$-(x^3 + 2x^2)$
$-4x^2 - 3x$
$-(-4x^2 - 8x)$
$5x + 12$
$-(5x + 10)$
2

Divide first term on inside with first term on outside.

Put answer into the quotient (above)

Multiply in

$\frac{x^3}{x} = x^2$

Subtract

$\frac{-4x^2}{x} = -4x$

Repeat

Remainder/Divisor

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Divide $(x^3 - 7x^2 + 14x - 8) \div (x - 4)$

$$x-4\overline{)x^3 - 7x^2 + 14x - 8} \quad x^2 - 3x + 2$$
$-(x^3 - 4x^2)$
$-3x^2 + 14x$
$-(-3x^2 + 12x)$
$2x - 8$
$2x - 8$
0

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1

Divide

$(x^3-3x^2+3x-1) \div (x^2-2x+1)$

$$
\begin{array}{r}
x - 1 \\
x^2-2x+1 \overline{)\; x^3-3x^2+3x-1} \\
-(x^3-2x^2+x) \\
\hline
-x^2+2x-1 \\
-(-x^2+2x-1) \\
\hline
0
\end{array}
$$

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Synthetic Division
Another way to divide polynomials if the divisor is linear and (x+a)

Find zero of divisor

$(x^3+5x^2-8x+2) \div (x+1)$

$$
\begin{array}{c|cccc}
 & x^3 & x^2 & x & C \\
-1 & 1 & 5 & -8 & 2 \\
 & \downarrow & -1 & -4 & 12 \\
\hline
 & 1 & 4 & -12 & 14
\end{array}
$$

$1x^2 + 4x - 12 + \dfrac{14}{x+1}$

- List coefficients at top (include variables)
- Bring down 1st term
- Multiply outside
- Add inside
- Write depressed equation (quotient) **remainder**

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

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

$$
\begin{array}{c|ccccc}
 & x^4 & x^3 & x^2 & x & C \\
3 & 1 & 0 & 3 & -2 & 5 \\
 & \downarrow & 3 & 9 & 36 & 102 \\
\hline
 & 1 & 3 & 12 & 34 & 107
\end{array}
$$

$x^3+3x^2+12x+34 + \dfrac{107}{x-3}$

Oct 31-11:37 AM

Why do we need long division?

Factor Theorem

- If the remainder is zero, then the divisor is a factor
- If P(b)=0, then b is a zero
- Use long division to "depress" the equation and factor completely

Nov 15-8:30 PM