Trig 4.3

Quiz 4.1-4.2 Thurs.

Find the factors of polynomials

x^2+6x+5

$(x+1)(x+5)$

Use the remainder theorem

Use the factor theorem

long division algorithm

synthetic division

depressed polynomial

activity: whiteboards

Long division algorithm:

54/3

235/26

$3 \cdot 18 = 54$

$$\begin{array}{r} 18 \\ 3\overline{)54} \\ -3 \\ \hline 24 \\ -24 \\ \hline 0 \end{array}$$

$$\begin{array}{r} 9\ R1 \\ 26\overline{)235} \\ -234 \\ \hline 1 \end{array}$$

$9\frac{1}{26}$

$26 \cdot 9 + 1$

How do you check long division?
How do you know if something is a factor?

$f(a) = 2a^2 + 3a - 8$

$f(2) =$

$f(2) = 2 \cdot 4 + 3 \cdot 2 - 8$

$= 8 + 6 - 8$

$= 6$

$a - 2 = 0$

$a = 2$

$$(a-2)\overline{)2a^2+3a-8}\quad 2a+7 \text{ R } 6$$

$-2a^2 + 4a$

$7a - 8$

$-7a + 14$

6

$2 \;|\; 2 \quad 3 \quad -8$

$\downarrow \quad 4 \quad 14$

$2 \quad 7 \quad 6$

divide:

what does x=?

$x^3 + 4x^2 - 3x - 5$ by $x + 3$ using synthetic division

$x+3 \overline{)\, x^3 + 4x^2 - 3x - 5}$

$-3 \;\big|\; 1 \quad 4 \quad -3 \quad -5$

$\qquad\quad -3 \quad -3 \quad 18$

$\rightarrow \quad 1 \quad 1 \quad -6 \quad 13$

$x^2 + x - 6 + \frac{13}{x+3}$

Divide using synthetic division.

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

6. $(x^3 + x^2 - 17x + 15) \div (x + 5)$

=

$$\begin{array}{r|rrr} 2 & 1 & -1 & 4 \\ & \downarrow & 2 & 2 \\ \hline & 1 & 1 & 6 \end{array}$$

$x + 1 + \frac{6}{x-2}$

Long division algorithm
How do you know if it is a factor?

if $R = 0$

Factor Theorem	The binomial $x - r$ is a factor of the polynomial $P(x)$ if and only if $P(r) = 0$.

2 Divide $x^3 - x^2 + 2$ by $x + 1$ using synthetic division.

$$\begin{array}{r|rrrr} -1 & 1 & -1 & 0 & 2 \\ & \downarrow & -1 & 2 & -2 \\ \hline & 1 & -2 & 2 & 0 \end{array}$$

$x^2 - 2x + 2$

Is x+1 a factor?

synthetic division OK except:

3 **Use the Remainder Theorem to find the remainder when $2x^3 - 3x^2 + x$ is divided by $x - 1$. State whether the binomial is a factor of the polynomial. Explain.**

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

Watch out for missing terms (zero)

Use the Remainder Theorem to find the remainder for each division. State whether the binomial is a factor of the polynomial.

7. $(x^2 + 2x - 15) \div (x - 3)$

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

$81 + 9 + 2$

$\boxed{3}$

$(x+3)(\quad)(\quad)(\quad)$

How many will there be?
remainder = 0
depressed polynomial
what to try?

Determine the binomial factors of each polynomial.

9. $x^3 - 5x^2 - x + 5$ $\pm 1 \pm 5$

10. $x^3 - 6x^2 + 11x - 6$ $\pm 1, 2, 3, 6$

$(x-1)(x-3)(x-2)$ 1

	1	−6	11	−6
↓		1	−5	6
	1	−5	6	0

$-3 \times -2 = 6$, $-3 + -2 = -5$

$x^2 - 5x + 6$

$\pm 1\ 2\ 3\ 6$

How is this problem different?

4 **Determine the binomial factors of $x^3 - 7x + 6$.**

$1 \;|\; 1\ \ 0\ \ -7\ \ 6$

$\downarrow\ \ 1\ \ 1\ \ -6$

$1\ \ 1\ \ -6\ \ 0$

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

$3 \times -2 = -6$

$3 + -2 = 1$

5 Find the value of k so that the remainder of $(x^3 + 3x^2 - kx - 24) \div (x + 3)$ is 0.

k=?

$-k$

-3 | $1 \quad 3 \quad -k \quad -24$

$\downarrow \quad -3 \quad 0 \quad (24)$

$1 \quad 0 \quad -k \quad 0$

$-k(-3) = 24$

$\frac{3k}{3} = 24$

4.3 15-39.

4.3 WB