8.3 More Division

Quiz Thursday!

~~Warm-Up in your notes!!~~

Are the following expressions polynomials? Why or why not?

1. $2x^3 + x^2 - 6x - 3$ ✓ degree: 3
2. $\sqrt{x} + 4$ ✗
3. $(x^1 + \sqrt{3})(x^1 - \sqrt{3})$ ✓ degree: 2
4. $x^{-1} + 5x^2 + 8$ ✗

$\frac{1}{x}$

8.3 More Division

EQ: How do I divide polynomials?

Multiply...

$$-3x^2\left(4x^3-2x^2+1x^1-1\right)$$

$-12x^5+6x^4-3x^3+3x^2$

coefficients → multiplied
exponents → add

Divide...

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

$\frac{-5x^3}{x}+\frac{2x^2}{x}-\frac{4x}{x}=-5x^2+2x-4$

8.3 More Division

~~EQ:~~ How do I divide polynomials?

You can only use synthetic division when...

divisor is a first degree binomial

ex. $x-2$ $x+8$ ~~x^2-2~~ $2x+1$ ☹

8.3 More Division

EQ: How do I divide polynomials?

ex. Remember placeholders (0's)

$$\frac{3x^3+4x+11}{x^2-3x+2}$$

$3x+9$

$x^2-3x+2 \;\big|\; 3x^3+0x^2+4x+11$

$-3x^3+9x^2+6x$ ↓

$9x^2-2x+11$

$-9x^2+27x-18$

$25x-7$

Quotient: $3x+9$
Remainder: $25x-7$

ex. Synthetic ☺

$$\frac{2x^3+4x^2+0x-5}{x+3}$$

change sign

$-3 \;|\; 2 \;\; 4 \;\; 0 \;\; -5$

↓ $-6 \;\; 6 \;\; -18$

$2 \;\; -2 \;\; 6 \;\; |-23$

Quotient: $2x^2-2x+6$ (one degree less)
Remainder: -23

8.3 More Division

EQ: How do I divide polynomials?

SYNTHETIC DIVISION

only works when divisor is first degree binomial

$$2 \mid 3 \quad 0 \quad -8 \quad -11 \quad 1$$
$$\downarrow \quad 6 \quad 12 \quad 8 \quad -6$$
$$3 \quad 6 \quad 4 \quad -3 \quad \underset{\text{remainder}}{-5}$$

$$3x^3+6x^2+4x-3 \text{ R-5}$$

synthetic basics

1. Bring down 1st #
2. Multiply
3. Add down column
4. Repeat for each column
5. Answer is one degree less

LONG DIVISION

$$3x^3+6x^2+4x-3 \text{ R-5}$$
$$x-2 \overline{)\, 3x^4+0x^3-8x^2-11x+1}$$
$$-(3x^4+6x^3)$$
$$6x^3-8x^2$$
$$-(6x^3-12x^2)$$
$$4x^2-11x$$
$$-(4x^2-8x)$$
$$-3x+1$$
$$-(-3x+6)$$
$$-5$$

to check your answer...

answer * divisor + remainder = original

Name:

8.3 Dividing Polynomials

13–22 ■ Find the quotient and remainder using long division.

13. $\frac{x^2 - 6x - 8}{x - 4}$

15. $\frac{4x^3 + 2x^2 - 2x - 3}{2x + 1}$

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

19. $\frac{6x^3 + 2x^2 + 22x}{2x^2 + 5}$

21. $\frac{x^6 + x^4 + x^2 + 1}{x^2 + 1}$

23–36 ■ Find the quotient and remainder using synthetic division.

23. $\frac{x^2 - 5x + 4}{x - 3}$

25. $\frac{3x^2 + 5x}{x - 6}$

27. $\frac{x^3 + 2x^2 + 2x + 1}{x + 2}$

29. $\frac{x^3 - 8x + 2}{x + 3}$

31. $\frac{x^5 + 3x^3 - 6}{x - 1}$

33. $\frac{2x^3 + 3x^2 - 2x + 1}{x - \frac{1}{2}}$

35. $\frac{x^3 - 27}{x - 3}$

8.3 More Division

Quiz Thursday!

~~Warm-Up Tuesday~~

Are the following expressions polynomials? Why or why not?

1. $2x^3 + x^2 - 6x - 3$
2. $\sqrt{x} + 4$
3. $\left(x + \sqrt{3}\right)\left(x - \sqrt{3}\right)$
4. $x^{-1} + 5x^2 + 8$

~~About Me~~

1. What movie are you most looking forward to seeing?
2. Going to the movie theatre or waiting for netflix?