p. 99

6. not poly.
8. not poly.
10. 76

p. 107

56.
a. 4
b. 4
c: 6

49.) $V = \pi r^2 h$

$V = \pi (x-4)^2 (2x+3)$

$= \pi (x^2 - 8x + 16)(2x+3)$

$= \pi (2x^3 - 13x^2 + 8x + 48)$

$= 2\pi x^3 - 13\pi x^2 + 8\pi x + 48\pi$

	x^2	$-8x$	16
$2x$	$2x^3$	$-16x^2$	$32x$
3	$3x^2$	$-24x$	48

$$(2x-7)^3 \neq (2x)^3 - (7)^3$$

$$(2x-7)(2x-7)(2x-7)$$

$$(4x^2-28x+49)(2x-7) \qquad (2x\cdot 7)^3$$

$$(x+2)^2 \neq x^2+4$$

21.)

$$\begin{array}{r|lll} & a^2 & -10a & -2 \\ \hline 2a & 2a^3 & -20a^2 & -4a \\ -3 & -3a^2 & 30a & 6 \end{array}$$

$$2a^3 - 23a^2 + 26a + 6$$

$$(x-1) - (3x-5)$$

$$x - 1 - 3x + 5 = -2x + 4$$

17.)

-6	1	8	-7	35
	$\downarrow$	-6	-12	114
	1	2	-19	149

19.)

$$\begin{array}{r|rrrrr} 2 & -2 & 3 & 0 & -8 & 13 \\ & & -4 & -2 & -4 & -24 \\ \hline & -2 & -1 & -2 & -12 & -11 \end{array}$$

21.)

3	-7	11	4	0
		-21	-30	-78
	-7	-10	-26	-78

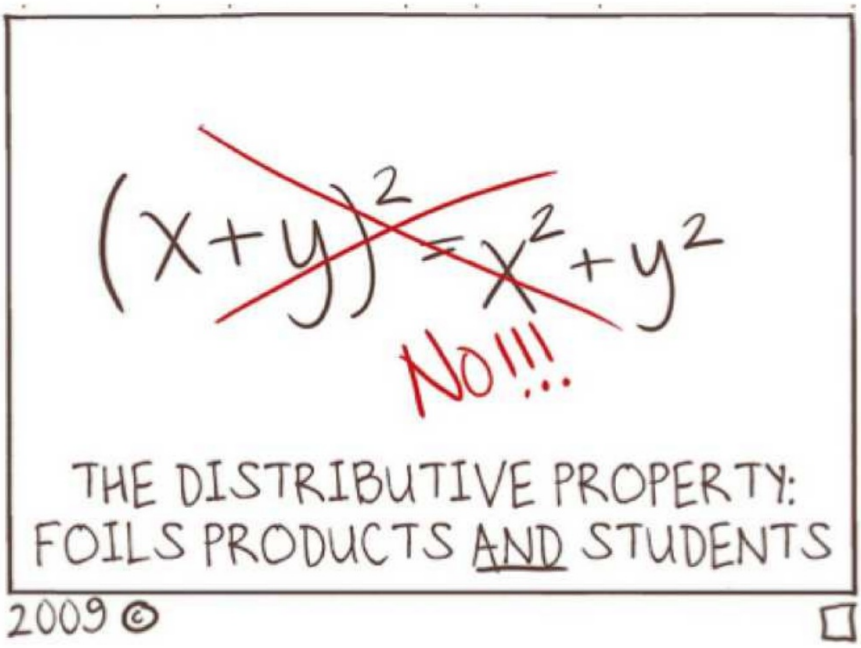
$$f(2) = 8(2) + 5(2)^4 - 3(2)^2 - (2)^3$$

$$= 16 + 80 - 12 - 8$$

$$= 96 - 20$$

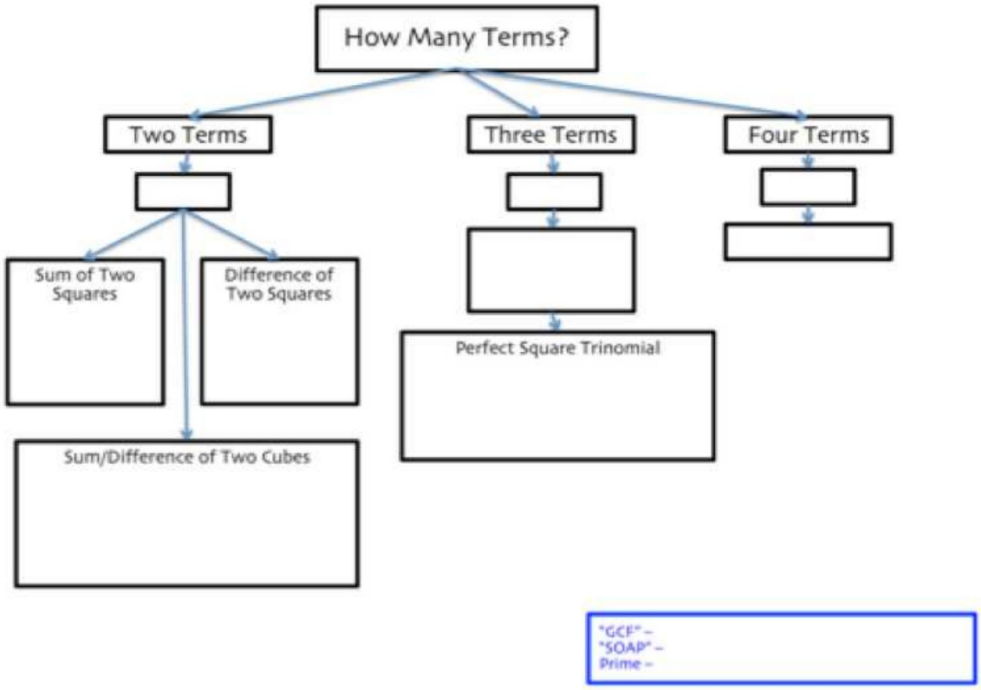
$$76$$

Factoring Bootcamp 2
2.4 Factor and Solve Polynomial Equations



HW:

*Grab your factoring flowchart!



REVIEW:

ex: Factor completely.

a) $x^2 - 9$

b) $2x^2 - 3x - 14$

c) $9x^2 + 12x + 4$

REVIEW:

ex: Factor completely.

d) $2x^2 + 162$

e) $x^3 + 3x^2 - 2x - 6$

f) $x^3 - 3x^2 - 16x + 48$

Perfect Cubes

$1^3 =$ 1

$2^3 =$ 8

$3^3 =$ 27

$4^3 =$ 64

5^3 125

$6^3 =$ 216

$10^3 =$ 1000

Sum/Difference of Cubes

x^3+27 $a^3+b^3=(a+b)(a^2-ab+b^2)$

$a^3-b^3=(a-b)(a^2+ab+b^2)$

SOAP

$$\frac{(3x^4y^{-5})^{-2}z^0}{51x^{-3}y^5z^6} = \frac{3^{-2}x^{-8}y^{10}}{51x^{-3}y^5z^6}$$

$$\frac{y^{10}x^3}{51\cdot 3^2 x^8 y^5 z^6}$$

$$\frac{y^5}{459x^5z^6}$$

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

$$\begin{array}{r|lll} & x^2 & 2x & 4 \\ \hline x & x^3 & 2x^2 & 4x \\ -2 & -2x^2 & -4x & -8 \end{array}$$

Remembering the SIGNS in the Cubes Formula

SOAP

S - same sign

O - opposite sign

AP - always positive

ex: Factor completely.

a) $x^3 - 27 = (x-3)(x^2+3x+9)$

$a = x$

$b = 3$

b) $x^3 + 216 = (x+6)(x^2-6x+36)$

$a = x$

$b = 6$

ex: Factor completely.

c) $8x^3+1$ $(2x+1)(4x^2-2x+1)$

$a=2x \quad a^2=4x^2$

$b=1$

d) $7000-7x^3 = -7(x^3-1000) = 7(1000-x^3)$ $a=10$, $b=x$

$= 7(10-x)(100+10x+x^2)$

or

$= -7(x-10)(x^2+10x+100)$

ex: Factor completely.

e) $x^6 - 1$

Quadratic Form

a, b, e, f

$$ax^{2n} + bx^{n} + c$$

$x^2 + 7x + 12$

$(x+4)(x+3)$

$x^4 + 7x^2 + 12$

$(x^2+4)(x^2+3)$

ex: Factor completely.

a) $x^2 - 3x - 4$

$(x-4)(x+1)$

b) $x^{10} - 3x^5 - 4$

$(x^5-4)(x^5+1)$

ex: Factor completely.

c) $x^{\frac{2}{13}} - 3x^{\frac{1}{13}} - 4$

d) $x^{2n} - 3x^{n} - 4$

ex: Factor completely.

$(x^2+1) \neq (x+1)^2$

e) $x^4 - 3x^2 - 4$

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

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

f) $x^6 - 3x^3 - 4$

$(x^3 - 4)(x^3 + 1)$

$(x^3-4)(x+1)(x^2-x+1)$

ex: Factor completely.

g) $2x^4 + 7x^2 + 6$

$(2x^2 + 3)(x^2 + 2)$

h) $2x^{11} - 9x^6 + 10x$

$x(2x^{10} - 9x^5 + 10)$

$x(2x^5 - 5)(x^5 - 2)$

ex: Factor completely.

$8x^2 - 7x - 1$

i) $8x^6 - 7x^3 - 1$

$(8x^3 + 1)(1x^3 - 1)$

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

j) $16x^4 - 24x^2 + 9$

$(4x^2 - 3)^2$

ex: Factor completely.

k) $x^5 - x^3 + 64x^2 - 64$

$x^3(x^2-1) + 64(x^2-1)$

$(x^2-1)(x^3+64)$

$(x+1)(x-1)(x+4)(x^2-4x+16)$

Theorem:

A polynomial equation with degree n has $\_n\_$ solutions.

Vocabulary:

solutions/roots - answers to an equation

zeros - quantities that make a function equal to zero

ex: Solve by factoring.

2 solutions

a) $x^2 - 8x + 15 = 0$

$(x-5)(x-3) = 0$

$x = 5, 3$

ex: Solve by factoring.

4 solutions

b) $2x^4 + 7x^2 - 15 = 0$

$(2x^2 - 3)(x^2 + 5) = 0$

$2x^2 - 3 = 0$

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

$|x| = \frac{\sqrt{6}}{2}$

$x = \pm\frac{\sqrt{6}}{2}$

$x^2 + 5 = 0$

$\sqrt{x^2} = \sqrt{-5}$

$|x| = i\sqrt{5}$

$x = \pm i\sqrt{5}$

$x^5 + 6x^4 = 0$

$x^4(x+6) = 0$

0 mult of 4

-6

ex: Solve by factoring.

c) $24x^4 + 3x = 0$

$3x(8x^3 + 1) = 0$

$3x(2x+1)(4x^2 - 2x + 1) = 0$

$x = 0, \quad -\frac{1}{2}$

$x = \frac{2 \pm \sqrt{4 - 4(4)(1)}}{8}$

$x = \frac{2 \pm \sqrt{-12}}{8} = \frac{2 \pm 2i\sqrt{3}}{8}$

$\frac{1 \pm i\sqrt{3}}{4}$

ex: Solve by factoring.

d) $x^3 - 5x^2 - 9x + 45 = 0$

$(x^2 - 9)(x - 5) = 0$

$\pm 3, 5$

ex: Solve by factoring.

e) $x^4 + 2x^2 + 1 = 0$

$(x^2+1)^2 = 0$

$x^2 + 1 = 0$

$x = \pm i$, mult. 2

i mult of 2

$-i$ mult of 2

ex: Solve by factoring.

f) $x^7 - 64x^5 = 0$

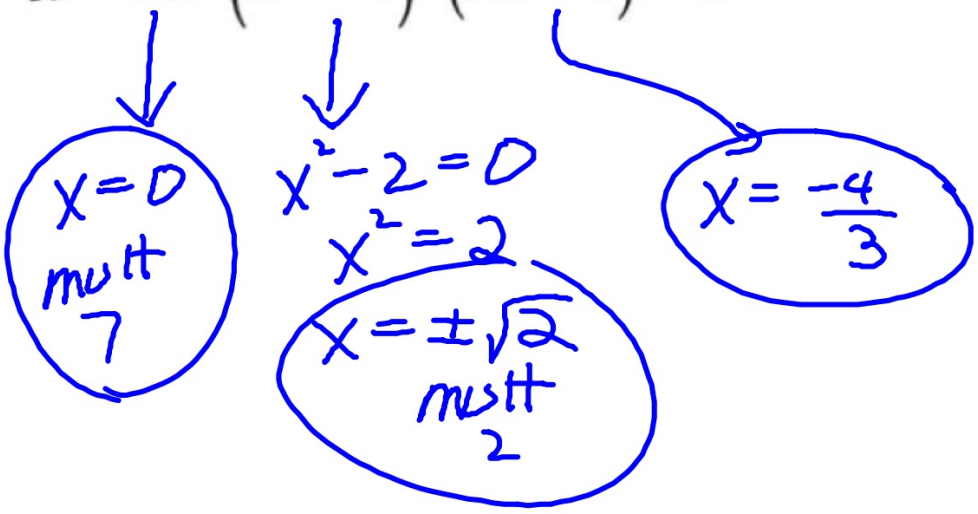
$x^5(x^2 - 64) = 0$

x^5 → 0 mult 5

$(x^2 - 64)$ → ± 8

ex: Solve by factoring.

g) $-2x^7\left(x^2-2\right)^2(3x+4)=0$



ex: Write a polynomial equation in standard form with integral coefficients and the given solutions.

a) 5, -2/3, 0

$(x-5)(3x+2)x = 0$

ex: Write a polynomial equation in standard form with integral coefficients and the given solutions.

b) 2i, -2i, 0 multiplicity 2

$(x^2+4)x^2=0$

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

$x^2+4=0$

$x^2+9=0$

Review

ex: Simplify.

$$\frac{\left(3x^4y^{-5}\right)^{-2}z^0}{51x^{-3}y^5z^6}$$

Review

ex: Evaluate using synthetic substitution.

$$f(x) = 5x^4 - x^3 + 7, \qquad f(3) = ?$$

Review

ex: Peform the indicated operation.

$$\left(x^2+x-6\right)-\left(5x^2-2x+3\right)$$