Day 26 Warm-Up

NEW SEATS!! :)

Find the number of roots for each equation. (aka how many solutions could it have?)

1. $5x^4 + 12x^3 - x^2 + 3x + 5 = 0$ — 4

2. $-x^{14} - x^8 + x + 7 = 0$ — 14

Find all the zeros for each function.

3. $y = x^3 - 5x^2 + 16x - 80$ — $\{5, \pm 4i\}$

$5 \mid 1 \quad -5 \quad 16 \quad -80$

$\quad\quad\downarrow \quad 5 \quad 0 \quad 80$

$\quad\quad 1 \quad 0 \quad 16 \quad 0$

$x^2 + 16 = 0$

$-16 \quad -16$

$\sqrt{x^2} = \sqrt{-16}$

$x = \pm 4i$

Write a polynomial function with rational coefficients so that $P(x) = 0$ has the given roots.

4. 5 and 9

$(x-5)(x-9)$

$x^2 - 14x + 45$

5. -4 and $2i$

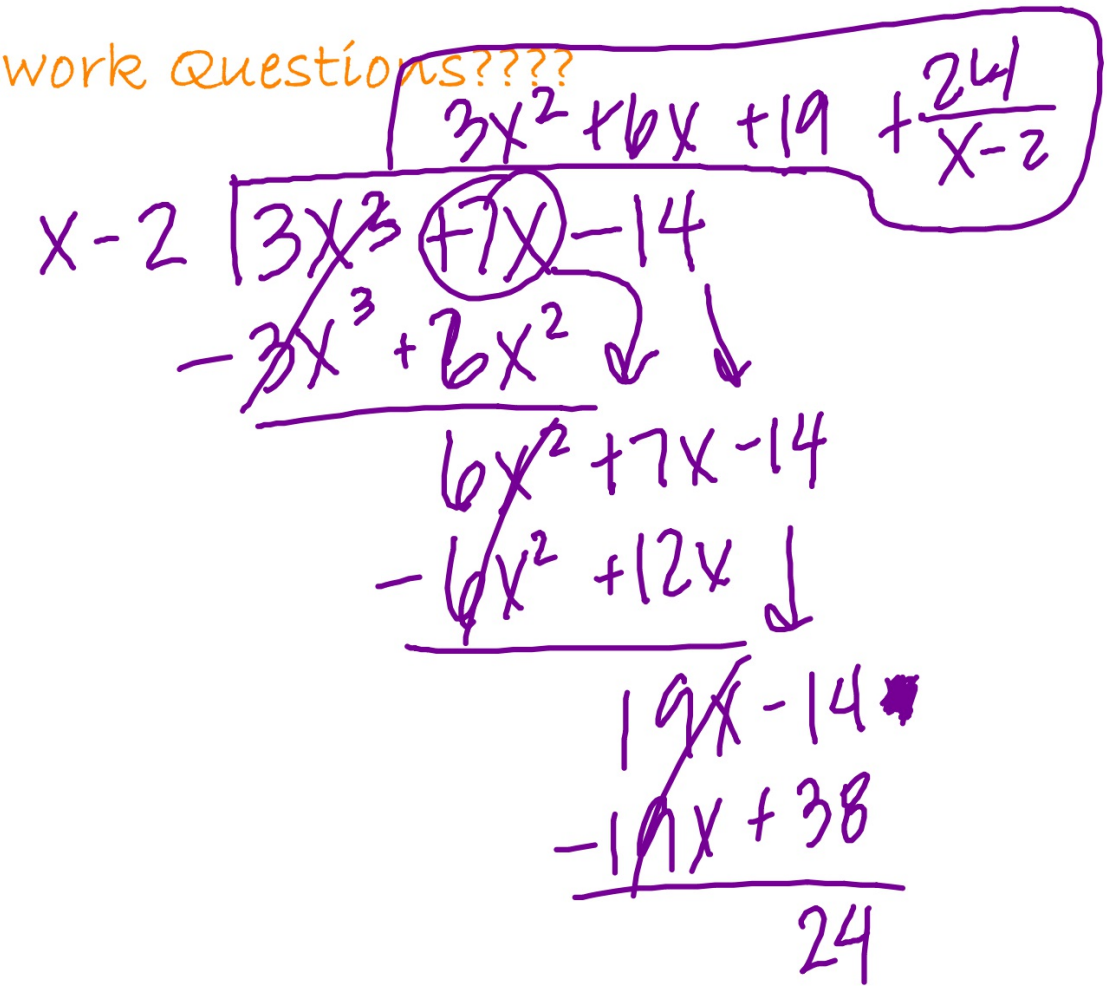
$-2i$

$(x+4)(x-2i)(x+2i)$

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

$x^3 + 4x^2 + 4x + 16$

Homework Questions????



Section 5.3: Solving Polynomial Equations

Objective:

Solve Polynomial Functions by Factoring

*GCF

*Difference of Squares

*Sum/Difference of Cubes

*Trinomials

*Four Terms

x^2-4

When solving a polynomial by factoring, remember to:

1) Set = 0
2) Factor using one of the rules to the left
3) Set your factors equal to zero and solve for x

• Sum/Diff of cubes $(a+b)(a^2-ab+b^2)$

• Trinomials

Example 1) Solve by factoring.

$x^3 - 1000 = 0$

What type is it?:

Factor:

Set factors = 0:

Solve for x:

$x^4-8x^2=-16$

$+16 \quad +16$

$x^4-8x^2+16=0$

$x^2-8x+16=0$

Example 2) Solve by factoring.

$6x^2 + 13x - 5 = 0$

What type is it?:

Factor:

Set factors = 0:

Solve for x:

$x^3+2x^2+5x+10=0$

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

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

$x=\pm\sqrt{5}, -2$

Example 3) Solve by factoring.

$x^4 - 8x^2 = -16$

What type is it?:

Factor:

Set factors = 0:

Solve for x:

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

$x^2-4=0 \quad x^2-4=0$

$x=\pm 2$

Example 4) Solve by factoring.

$x^3 + 2x^2 + 5x + 10 = 0$

What type is it?:

Factor:

Set factors = 0:

Solve for x:

Solve Polynomial Functions by Graphing

1) Set polynomial = 0
2) Put equation in y1
3) Put 0 in y2
4) Find the intersections using 2nd trace 5, enter three times. Remember to move the cursor close to each intersection before the three enters!

YOUR X-INTERCEPTS ARE YOUR REAL SOLUTIONS!

Example 5) Solve by graphing.

$x^3 - 4x^2 - 7x = -10$

Set = 0: $X^3-4X^2-7X=-10$

Y1=

Y2=

X-Values of Intersection Points:

2nd trace (calc) 5:Intersect $X=-2,1,5$

Example 6) Solve by graphing.

$4x^3 - 8x^2 + 4x = 0$

Set = 0: $4X^3-8X^2+4X=0$

Y1=

Y2=

$X=0,1,1$

X-Values of Intersection Points:

Example 7) Solve by graphing.

$x^2 - 8x = -7$

Set = 0: $X^2-8X=-7$

Y1=

Y2=

$X=1,7$

X-Values of Intersection Points:

Example 8) Solve by graphing.

$x^3 - x^2 - 16x = 20$

Set = 0: $X^3-X^2-16X=20$

Y1=

Y2=

$X=-5,-2,5$

X-Values of Intersection Points:

Example 1) Find a polynomial function whose graph passes through the set of points (-2, -4) and (8, 1)

Linear:

r^2 $r^2 = 1$ OR - (LinReg $r^2 = 1$)

Quadratic:

r^2

Cubic:

r^2 .5x - 3

Quartic:

r^2

Circle the equation that had the highest r^2!

(-2, -4) (8, 1)

QuadReg
r^2 = n/a

CubReg
r^2 = n/a

QuartReg
r^2 = n/a

Stat → edit

x	y
L1	L2
-2	-4
8	1

Stat → calc

Example 2) Find a polynomial function whose graph passes through the set of points (-1, 8), (5, -4), and (7, 8)

Linear:

r^2

$(-1,8)(5,-4)(7,8)$

Quadratic:

r^2 $r^2 = 1$ $x^2 - 6x + 1$

Cubic:

r^2

Quartic:

r^2

Circle the equation that had the highest r^2!

Example 3) Find a cubic and a quartic model for each set of values. Explain why one models the data better.

x	-2	-1	0	1	2
y	-65	-14	-4	2	90

Cubic:

r^2

Quartic:

r^2

$R^2 = 1$

$2.0416667x^4 + 10.25x^3 - 4.04x^2 - 2.25x - 4$

Circle the equation that had the highest r2!

Example 4) Find a polynomial function whose graph passes through the points: (-3, -50), (-2, -4), (-1, 10), (0, 7), and (2, -23)

Cubic:

r^2

Quartic:

r^2

$r^2 = 1$

quartic

$(-3,-50)(-2,-4)(-1,10)(0,7)(2,-23)$

$y = -.275x^4 + .85x^3 - 4.025x^2 - 8.15x + 7$

Circle the equation that had the highest r2!

Example 5) The table below shows the percentage of the U.S. labor force in unions for selected years between1955 and 2005.

Year	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005
%	33.2	31.4	28.4	27.3	25.5	21.9	18.0	16.1	14.9	13.5	12.5

a) Find a polynomial model that matches the data.

Linear:

r^2

Quadratic:

r^2

Cubic:

r^2

Quartic:

r^2

b) Use the model that you found to predict the percent of the labor force in the unions in the year 2020.

1. If you factor $x^3 - 8$ in the form $(x - a)(x^2 + bx + c)$, what is the value of a?

Ⓐ 2 Ⓑ -2 Ⓒ 4 Ⓓ -4

2. Which polynomial equation has the zeros 5, -3, and $\frac{1}{2}$?

Ⓕ $x^3 + 4x^2 + 4x - 45$ Ⓗ $2x^3 - 5x^2 - 28x + 15$

Ⓖ $x^3 - 4x^2 + 4x + 15$ Ⓘ $2x^3 + 5x^2 - 28x - 45$

3. What are the real roots of $x^3 + 8 = 0$?

Ⓕ 2 Ⓖ -2 Ⓗ $-2 \pm \sqrt{3}$ Ⓘ $-2 \pm \sqrt{5}$