Name: Key
CC ALGEBRA 2

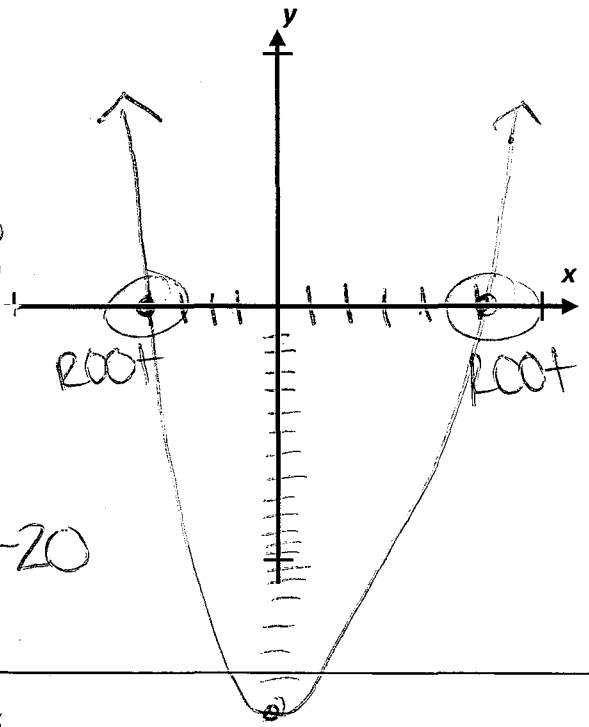
Date: 9/11/17
TROICI

LESSON #4: FACTORS VS. ROOTS

Do Now

Graph $f(x)=x^2-x-20$ on the coordinate axis below.

x	y
-4	0
-3	-8
-2	-14
-1	-18
0	-20
1	-20
2	-18
3	-14
4	-8
5	0



a) Identify the roots of the function based on the graph.

x = -4 and x = 5

b) Identify the factors of $f(x)=x^2-x-20$, based on the graph

(x+4) and (x-5)

check: $(x+4)(x-5)=x^2-5x+4x-20$

$\rightarrow x^2-x-20$

1) Use long division to find the quotient of x^2-x-20 and $x-5$.

$$x-5 \;\overline{)\; x^2-x-20}$$

$x+4$

$-x^2+5x$

$4x-20$

$-4x+20$

0 → remainder

∴ x+4 is a factor of x^2-x-20 and -4 is a root

★ FACTOR: $(x \pm a)$ ★

ROOT: $\pm a$

2) Find all the factors of $f(x)=x^3+2x^2-5x-6$ if $(x-2)$ is a factor.

① start by dividing → remainder = 0

degree = #factors

$$x-2 \;\overline{)\; x^3+2x^2-5x-6}$$

x^2+4x+3

$-x^3+2x^2$

$4x^2-5x$

$-4x^2+8x$

$3x-6$

$-3x+6$

0

② FACTOR what is left

$(x^2+4x+3)=0$ (a = 1, m = 3)

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

$x+3=0$ | $x+1=0$

$x=-3$ | $x=-1$

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

ROOTS: $\{2,-3,-1\}$

3) The function $P(x)=2x^3+4x^2-14x+8$ has a root of -4. Find ***all*** real solutions.

Factor $(x+4)$ ↓ roots!

① $2x^2-4x+2$

$x+4 \overline{)\,2x^3+4x^2-14x+8}$

$-2x^3 \oplus 8x^2$ ↓

$-4x^2-14x$

$+4x^2+16x$ ↓

$2x+8$

$-2x \oplus 8$

0

② $2x^2-4x+2$

$2x^2-2x \;|\; -2x+2$

$2x(x-1) \;|\; -2(x-1)$

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

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

$+1 \quad +1$

* OR look in calculator where $y=0$! *

4) (Graphing Calculator Practice.) What is the quotient of $\frac{x^2+6x+9}{x+3}$?

① $x+3$

2) x^2+2x+3

3) $x+2x$

4) $x+5$

$x+3 \overline{)\,x^2+6x+9}$

$x+3$

$-x^2 \oplus 3x$

$3x+9$

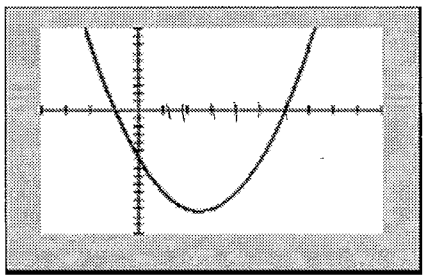
$-3x \oplus 9$

0

↳ $y=$

↳ look at graph identify equation of the line

5) For the polynomial function graphed to the right, identify:



a) Its roots: -1 and 6

b) Its factors: $(x+1)$ and $(x-6)$

c) Its equation: $(x+1)(x-6)$

$x^2-6x+x-6$

$y=x^2-5x-6$

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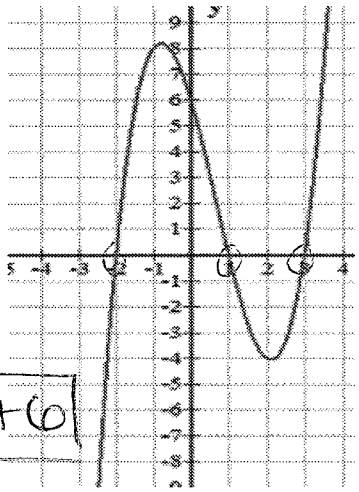
LAB #3

1) What is the equation of this function?



ROOTS: $-2, 1, 3$

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

$x^2 - x + 2x - 2$

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

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

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

2) What are one of the factors of the parabola on the right?

A) $x-5$

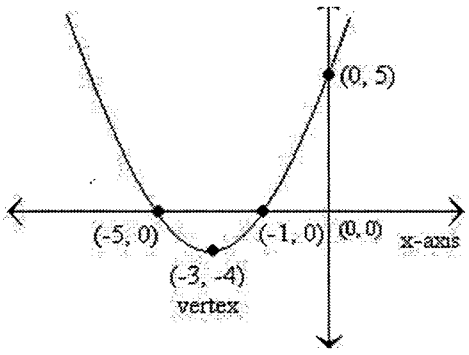
B) $x+3$

C) $x+1$

D) $x+4$

ROOTS: $-5, -1$

FACTORS: $(x+1)(x+5)$



3) In the equation, $y = 2x^4 + 3x^3 - 3x^2 + 2x - 8$,

a) What is the degree of the equation?

4

b) What is the y-intercept?

-8

4)

$$ax^3 + bx^2 + cx + d = 0$$

In the equation above, a, b, c, and d are constants. If the equation has roots -1, -3, and 5, which of the following is a factor of $ax^3 + bx^2 + cx + d$? $(x+1)(x+3)(x-5)$

A) $x-1$

B) $x+1$

C) $x-3$

D) $x+5$

5) The function $P(x)=x^3-2x^2-5x+6$ has a root at x = 1. Find ***all*** real solutions algebraically.

① $x-1 \overline{)x^3-2x^2-5x+6}$ $\quad x^2-x-6$

$-x^3+x^2$

$-x^2-5x$

$+x^2\ \ x$

$-6x+6$

$+6x\ \ 6$

0

FACTOR = $(x-1)$

② x^2-x-6 (a = 1, m = −6)

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

$x=3 \quad | \quad x=-2$

$\{-2, 1, 3\}$

6)

x	$f(x)$
0	3
2	1
4	0
5	−2

4 is a root

x − 4 is a factor

The function f is defined by a polynomial. Some values of x and $f(x)$ are shown in the table above. Which of the following must be a factor of $f(x)$?

$y=0$

A) $x-2$

B) $x-3$

C) $x-4$

D) $x-5$

7) Simplify: $-\frac{1}{3}\sqrt{180x^2}$

$-\frac{1}{3}\sqrt{30}\sqrt{5}\sqrt{x^2}$

$-\frac{1}{3}\cdot 6\cdot\sqrt{5}\cdot x$

$-2x\sqrt{5}$