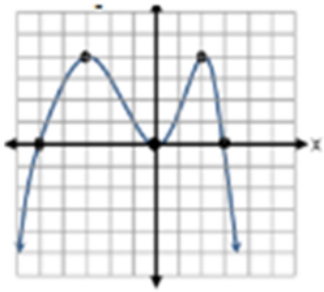
art A of your Performance Final Exam Grade

Name _____

Pd__

'olynomials -- Monday

. Write an equation to the following graph. (Hint: use the x-intercepts to write the equation)



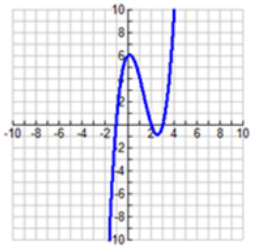
What are the x-intercepts? _____

Write your factors of the polynomial by using the x-intercepts. _____

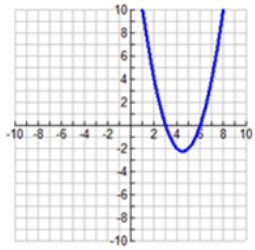
"FOIL" or Distribute your factors above _____

. Find the zeros, end behavior, maximum(s), and minimum(s) for each graph below.

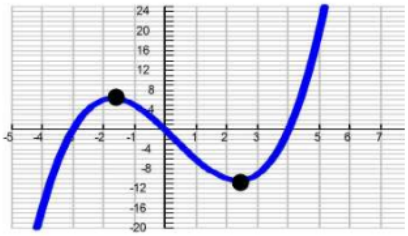
a.



b.



c.

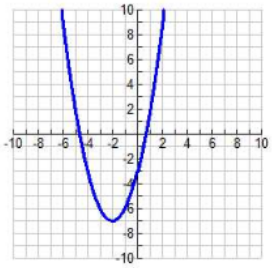


. Find the zeros

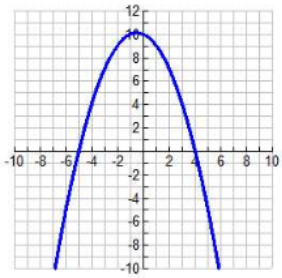
a. $y = 2x^2 - 12x + 7$ b. $y = x(x-2)(x+7)$ c. $y = 3x^3 + 21x^2 + 36x$

. What is the, , maximum, minimum, domain, and range of each graph below.

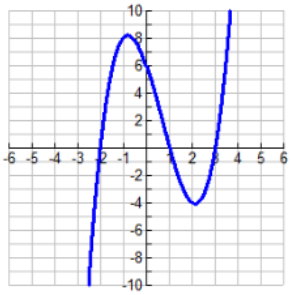
a.



b.



c.



. Solve the system: $-2y^2 - 3x - 13y - 3 = 0$
$x + 3y + 1 = 0$

$-2x^2 - x + y - 5 = 0$
$x - y = -1$

. Simplify the following functions.

a. $\frac{x^2+5x-6}{2x-2}$ b. $\frac{2x}{5}+\frac{x+1}{2x-3}$ c. $\frac{7}{2x+1}-\frac{8x}{x-5}$ d. $\frac{5x}{x+2}+\frac{3}{x}$

. Describe the transformations of the function from the parent graph of $f(x)=\frac{1}{x}$

a. $f(x)=\frac{1}{x-7}+4$ b. $f(x)=\frac{4}{x}$ c. $f(x)=-\frac{1}{x+3}$ d. $f(x)=-\frac{3}{x+2}-7$

. Describe the end behavior of the following functions

a. f(x) = 4(x + 3)(x – 5) b. f(x) = $x^2 + 7x + 12$ c. f(x) = $3(x-5)^2 + 7$

. Find the exact roots of the polynomial.

a. $x^3-7x^2+10x=0$ b. $x^2+100=0$ c. $x^4-10x^2+9=0$ d. $x^2-121=0$

e. $x^3+9x=0$ f. $x^2+18=0$ g. $x^4+x^2-2=0$

0. Write the polynomial equation of least degree for the roots given.

a. 1,0,-5 b. -2, $\pm 4i$ c. double root at 8, $\pm 3i$, 0

1. Divide.

a. $(x^3-4x^2+5x-11)\div(x-1)$ b. $(2x^4-3x+1)\div(x+3)$

2. Find the remainder for each division. Is the divisor a factor of the polynomial?

a. $(x^3-4x^2+100)\div(x-5)$ b. $(x^3-7x^2-16x+112)\div(x-4)$

R _____ Factor? _____ R _____ Factor? _____

3. Find all possible rational zeros of the function. Then determine all the zeros.

a. $f(x)=8x^3-6x^2-23x+6$ b. $f(x)=2x^4+3x^3-8x^2-9x+6$

Possible zeros: _____ Possible zeros: _____

Zeros: _____ Zeros: _____

4. Graph the following functions and find the domain, range, and find the maximum or minimum.

a. $y=(x+4)^2-3$ b. $y=-3x^2+12x-5$ c. $y=2x^2-12x+7$

Polynomial:

2 solutions Real or Imaginary

x^2 ....

x^2 .... 3 solutions

x^4 .... 4 solutions

x-ints.
roots.
solutions.
Solving for x.

$x^2+7x+12=0$

$7 = \_ + \_$ $\quad 12 = \_ \cdot \_$

$(x+3)(x+4)=0$

$x+3=0$ $\quad x+4=0$

$x=-3$ $\quad x=-4$

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

$2 \cdot 3 = 6$

$5 = 2 + 3$

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

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

$x^2+x+5x+5$

x^2+6x+5

$(x+6)(x-1)$

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

x^2+5x-6

$1x^3 + 1x^2 + 2x = 5 \div x + 1$

$x + 1 = 0$

$x = -1$

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

Synthetic Division

add

-1	1	1	2	-5
		-1(1) = -1	0	2
	1	0	2	(-7)

Not a factor

$x^2 + 0x + 2 - \frac{7}{x+1}$

Synthetic Division

$(3x^3 - 4x^2 + 6x - 5) \div (x+2)$

$$\begin{array}{r|cccc} -2 & 3 & -4 & 6 & -5 \\ & \downarrow & -6 & 20 & -52 \\ \hline & 3 & -10 & 26 & \boxed{-57} \end{array}$$

. Find the exact roots of the polynomial.

a. $x^3-7x^2+10x=0$ b. $x^2+100=0$ c. $x^4-10x^2+9=0$ d. $x^2-121=0$

e. $x^3+9x=0$ f. $x^2+18=0$ g. $x^4+x^2-2=0$

a) $x(x^2-7x+10)=0$ $1\cdot 10$, $2\cdot 5$, $-1\cdot -10$, $-2\cdot -5$; $-7=-2-5$, $10=(-2)(-5)$

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

$x=0$ $x-5=0$ $x-2=0$

$x=5$ $x=2$

b) $x^2+100=0$

$-100 \quad -100$

$\sqrt{x^2}=\sqrt{-100}$

$x=\pm\sqrt{-100}$

$x=\pm i\sqrt{100}$

$x=\pm 10i$

c. $x^4-10x^2+9=0$

$-10=-1-9$

$(x^2-1)(x^2-9)=0$ $x^4-9x^2-x^2+9$

$x^2-1=0$ $x^2-9=0$ x^4-10x^2+9

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

$x=\pm 1$ $x=\pm 3$

$4x^2 - 9 = 0$

$4x^2 = 9$

$4x^2/4 = 9/4$

$x^2 = 9/4$

$x = \pm\sqrt{9/4}$

$\sqrt{4x^2} - \sqrt{9} = 0$

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

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

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

3. Find all possible rational zeros of the function. Then determine all the zeros.

a. $f(x) = 8x^3 - 6x^2 - 23x + 6$

Possible zeros: $\pm p/q$

Zeros: _____

b. $f(x) = 2x^4 + 3x^3 - 8x^2 - 9x + 6$

Possible zeros: _____

Zeros: _____

$\pm \frac{p}{q} = \pm \frac{(6)\ 1,2,3,6}{(8)\ 1,2,4,8}$

$1/1, 1/2, 1/4, 1/8$

$2/1, 2/2, 2/4, 2/8$

then determine all the zeros.

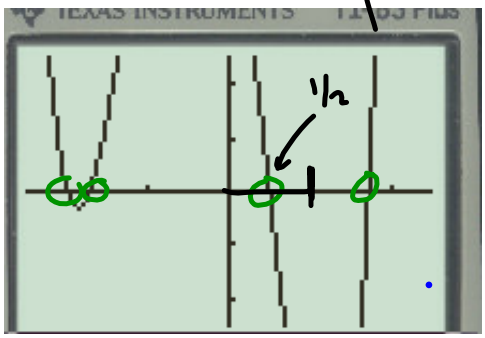
b. $f(x) = 2x^4 + 3x^3 - 8x^2 - 9x + 6$

q: 2 p: 6

Possible zeros: _____ $\pm p/q = \pm 1, 2, 3, 6 / 1, 2$

Zeros: _____

$(x - 1/2) = 0$, $x - 1/2 = 0$, $x = 1/2$



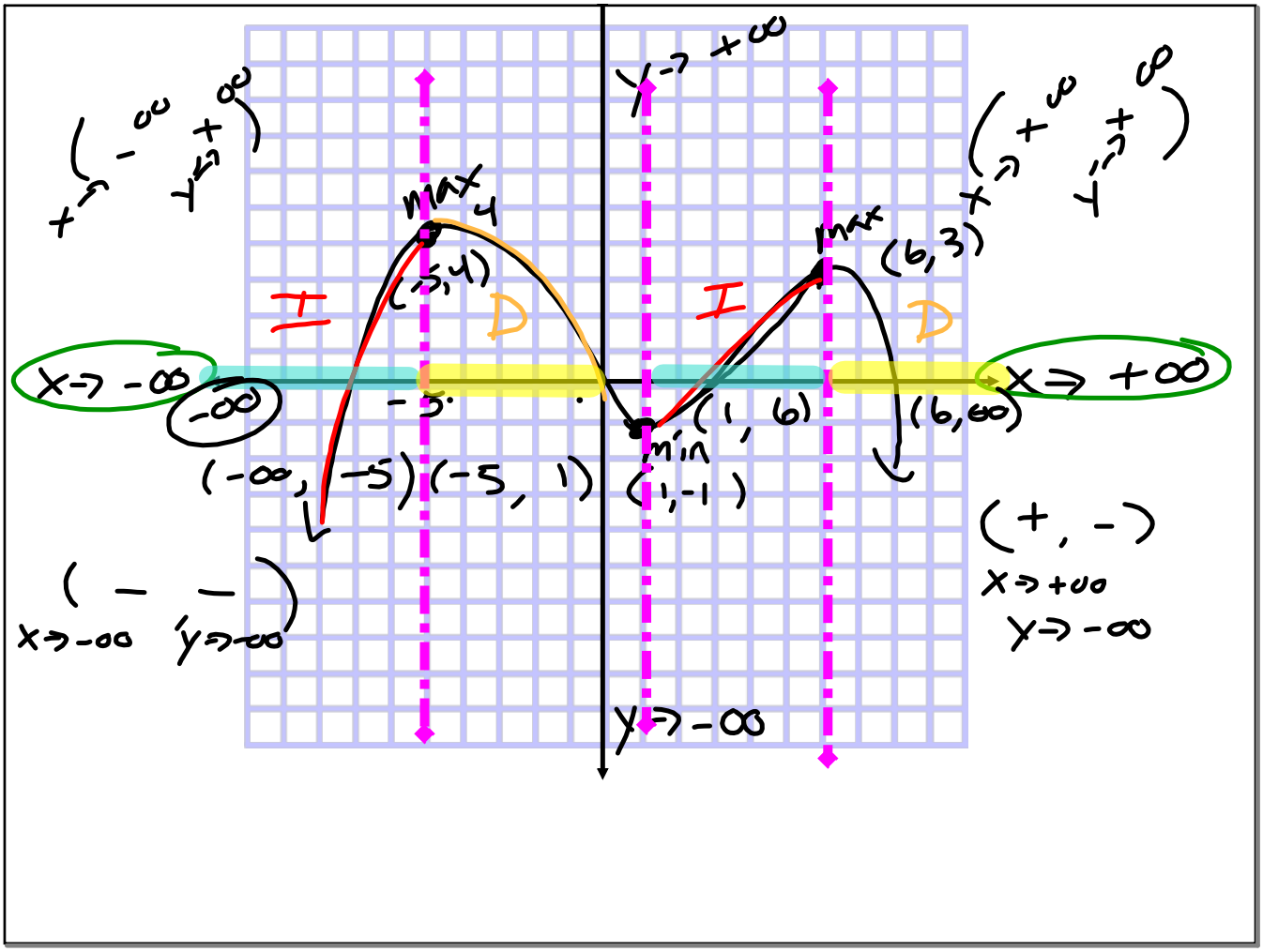
-2	2	3	-8	-9	6
	↓	-4	2	12	-6
	2	-1	-6	3	0

x^3 x^2 x constant

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

-2	2	-1	-6	3
	↓	-4	10	-8
	2	-5	4	5

R: 5


x -> -∞ y -> +∞
x -> +∞ y -> +∞
y -> +∞
max
4
(-5,4)
(6,3)
I
D
I
D
x -> -∞
x -> +∞
-∞
-5
1
(1, 6)
(6,∞)
min
(1,-1)
(-∞,-5)
(-5, 1)
(- , -)
x -> -∞ y -> -∞
(+ , -)
x -> +∞
y -> -∞
y -> -∞

$x \to -\infty$ $x \to +\infty$

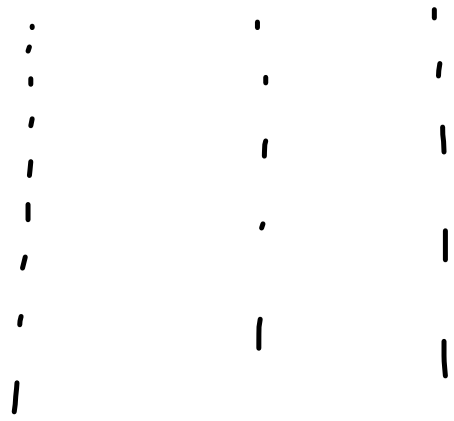
$y \to -\infty$ $y \to -\infty$

max (-5, 4) (6, 5)

min (1, -1)

INC

DEC



Mar 23-3:53 PM

$3x^3 + 21x^2 + 36x$

$x(3x^2 + 21x + 36)$

$3x(x^2 + 7x + 6)$

$3x(x+6)(x+1)$

$3x=0 \quad x+6=0 \quad x+1=0$

Mar 23-4:02 PM

$-2y^2 - 3x - 13y - 3 = 0$

$x + 3y + 1 = 0$

Solve x

$x = -3y - 1$

$x + 3y + 1 = 0$
$-1 \quad -1$

$x + 3y = -1$
$-3y \quad -3y$

$x = -3y - 1$

$-2y^2 - 3(-3y - 1) - 13y - 3 = 0$

$-2y^2 + 9y + 3 - 13y - 3 = 0$

$-2y^2 - 4y = 0$

$(-2y)(y + 2) = 0$

$\frac{-2y}{-2} = \frac{0}{-2}$ $\quad y + 2 = 0$

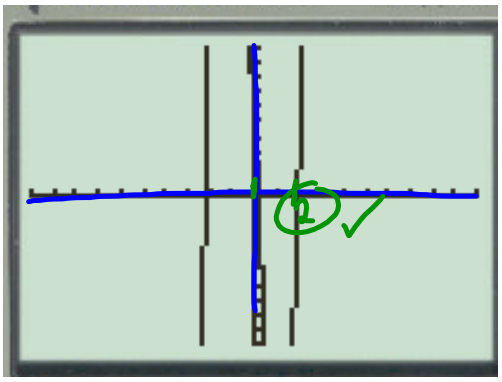
$y = 0$ $\quad y = -2$

$x =$ $\quad x =$

a. $f(x) = 8x^3 - 6x^2 - 23x + 6$

Possible zeros: $\pm p/q$

Zeros: $-3/4, 1/2, 2$



2 | 8 -6 -23 6

↓ 16 20 -6

8 10 -3 0

x^2 x constant

$8x^2 + 10x - 3$

-24

$- = - \cdot -$

$- = - + -$

$$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$\frac{-10 \pm \sqrt{10^2-4(8)(-3)}}{2(8)}$$

$$\frac{-10 \pm \sqrt{100-96}}{16}$$

$$\frac{-10 \pm \sqrt{4}}{16} = \frac{-10 \pm 2}{16}$$

$\frac{-10+2}{16}$ $\frac{-10-2}{16}$

$\frac{8}{16}$ $\frac{-12}{16}$

$= 1/2$ $= -3/4$

1. Divide. $1x^3-4x^2+5x-11$

a. $(x^3-4x^2+5x-11)\div(x-1)$

1 | 1 -4 5 -11

1 -3 2

1 -3 2 | -9

b. $(2x^4-3x+1)\div(x+3)$ $=0$ $x=-3$

$2x^4+0x^3+0x^2-3x^1+1$

-3 | 2 0 0 -3 1

2 -6 18 -54 171

+22

multiply

2 -6 18 -57 | 172

x^3 x^2 x constant

$2x^3-6x^2+18x-57$ R. 172

$4x^3 + 6x^2 - 5x + 1$ (q = 4, p = 1)

Factors of 4: 1, 4; 2, 2

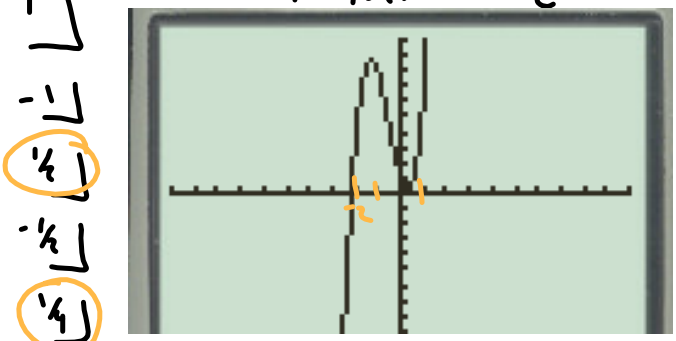
FACTORS of 1: 1, 1

possible rational roots: $\pm p/q$

$\pm \frac{\text{Factors of } p}{\text{factors of } q} = \pm \frac{1}{1,2,4}$

$= \pm\frac{1}{1}, \frac{1}{2}, \frac{1}{4}$

$= \pm 1, \pm\frac{1}{2}, \pm\frac{1}{4}$



Mar 23-3:02 PM

:. Find the remainder for each division. Is the divisor a factor of the polynomial?

a. $(x^3 - 4x^2 + 100) \div (x - 5)$

R _____ Factor? _____

b. $(x^3 - 7x^2 - 16x + 112) \div (x - 4)$

R _____ Factor? _____

~~Rational Functions - Tuesday~~

5. Graph the following functions and find the vertical asymptote(s), horizontal asymptote(s), and holes.

a. $y = \dfrac{x+3}{x^2+21x+54}$ b. $y = \dfrac{x^2-6x+3}{x^2+5x-24}$

6. Simplify

$\dfrac{+5}{3x} \div \dfrac{x-4}{x}$ $\dfrac{x^2+5x-14}{x-1} \div \dfrac{x-2}{5}$ $\dfrac{3x+12}{3x} \cdot \dfrac{x+1}{x^2}$

7. Solve for the variable. Check your solutions and restrictions.

a. $\frac{2x}{3} + \frac{4x}{9} = \frac{1}{5}$ b. $\frac{x+3}{x+2} + \frac{4x}{x-5} = \frac{7}{x+2}$ c. $\frac{5}{x-2} + \frac{4}{3x} = \frac{1}{3x}$

18. Graph the following functions A. $y = \frac{x-4}{(x-2)(x+5)}$ B. $y \leq \frac{x}{(x-2)}$ C. $y = \frac{x-4}{x^2-6+8}$ D. $y > \frac{2x}{(x-5)}$

19. Solve the following rational inequalities

A. $\frac{x-4}{(x-2)(x+5)} = 0$ B. $\frac{x-1}{x^2+2x-3} \leq 0$ C. $\frac{x-1}{x+6} > 0$

adical Functions -- Wednesday

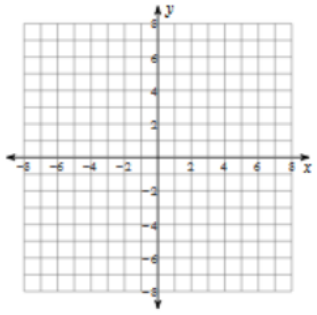
Solve each equation. Remember to check for extraneous solutions.

1) $v = \sqrt{5v+5} - 1$

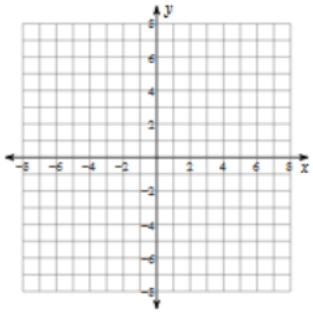
2) $x = 3 + \sqrt{6x - 27}$

Sketch the graph of each function.

3) $y = \sqrt{x} - 3$



4) $y = -2 + \sqrt{x-1}$



Simplify.

5) $-3\sqrt[3]{81} + 2\sqrt[3]{40} - 2\sqrt[3]{135}$

6) $-2\sqrt[4]{32} - \sqrt[4]{162} - 3\sqrt[4]{162}$

7) $(-3\sqrt{5} + 4\sqrt{2})(2\sqrt{5} - 2\sqrt{2})$

8) $(-1 - 4\sqrt{2})(1 - \sqrt{2})$

9) $\dfrac{4+3\sqrt{5}}{\sqrt{10}}$

10) $\dfrac{-5-\sqrt{2}}{2\sqrt{15}}$

11) $\dfrac{3}{-3-\sqrt{5}}$

12) $\dfrac{\sqrt{3}}{3\sqrt{2}+\sqrt{5}}$

13) $\sqrt{125x^3y^2}$

14) $\sqrt[3]{250x^5y^6}$

4. Solve: $\sqrt{2x-4} \geq 4$ $\sqrt{2x-5} = \sqrt{x+8}$

5. Graph: $y < \sqrt{x+3} - 2$ $y \geq \sqrt{x-5} + 7$

6. Solve: $x^2 + 7x + 12 \leq 0$ $2x^2 - 5x - 12 > 0$

7. Graph: $y > x^2 - 6x + 8$ $y \leq x^2 + 2x + 1$