College Algebra M121 Name:_____Period____
Chapter 3 PRACTICE TEST Mrs. Goody

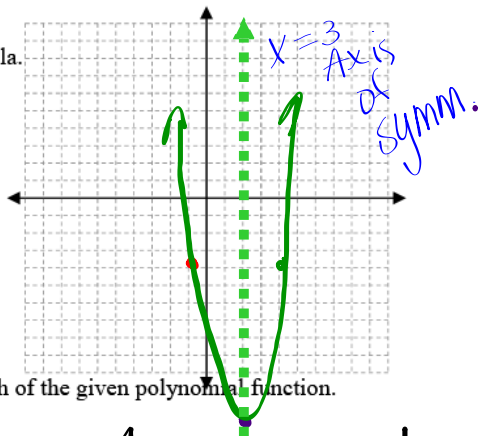
Each problem must be solved with supportive work. Your work is to be organized and neatly written to the best of your ability.

1. Graph $f(x) = x^2 - 6x - 4$ by finding the following parts of this parabola.

$\left(\frac{-b}{2a}, P \text{ or } C\right)$ Vertex

y-intercept $(0, -4)$

Axis of Sym $x = \frac{-b}{2a}$ $\frac{-b}{2a}$ $\frac{+6}{2(1)}$ $3^2 - 6(3) - 4$ $9 - 18 - 4$ $(3, -13)$ Vertex



2. Use the leading coefficient test to determine the end behavior of the graph of the given polynomial function.
$f(x) = -x^4 + 3x^3 - x + 9$

Left-side down

Right-side down

degree = 4 L.C = -1

field goal opening down

3. Find the x-intercepts. State whether the graph crosses the x-axis (fly right threw) or touches the x-axis and turns around (love tap), at each intercept.
$f(x) = x^3 - 4x^2$

FACTOR

$0 = x^2(x-4)$ $x=4$ fly $x=0$ Mult 2 love tap

Even Mult Love tap
Odd Mult fly

4. Use the Rational Zero Theorem to list ***all possible*** rational zeros for
$f(x) = 5x^4 + x^3 - 16x^2 - 8x + 10$. $\pm1 \pm2 \pm5 \pm10$ / $\pm1 \pm5$

Pool of Possibilities

P factors Constant

q factors LC

$\pm1 \pm\frac{1}{5}$ $\pm2 \pm\frac{2}{5}$ $\pm5 \pm10$

5. Find ALL the zeros $f(x) = x^3 - 5x^2 + 17x - 13$

① Degree → 3 Roots 3 R 0 imag / 1 R 2 imag

② Pool of Possibles $\pm1 \pm13$ / ±1

③ Calculator find 1 nice root $x=1$ ±1 ±13

④ Synthetic divide

1	1	-5	17	-13
		1	-4	+13
	1	-4	13	0

$(x-1)(x^2-4x+13)$ Complete the Sqr

$x=1$ $x^2-4x+4 = -13+4$ $(x-2)^2 = -9$ $x-2 = \pm3i$ $x = 2 \pm 3i$

answer $x=1$

6. Use Descartes Rule of Signs to determine the possible numbers of positive and negative real zeros of
$f(x) = x^3 + 7x^2 - x + 7$.

a. What is the possible number of positive real zeros?

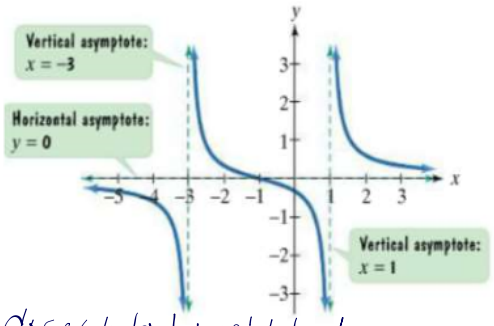
find sign of each term + +① −② + 2 sign changes 2 or 0 positive roots

b. What is the possible number of negative real zeros?

replace x with (−x) Simplify Count the # of sign changes

$(-x)^3 + 7(-x)^2 - (-x) + 7$ − ① + + + 1 negative root

7. Use the graph of the rational function to the right to complete the following statements.



a. As $x \to -3^+$, $f(x) \to$ ∞

approach -3 from + Right

b. As $x \to 1^-$, $f(x) \to$ $-\infty$

approaches 1 from Left

c. As $x \to \infty$, $f(x) \to$ 0

approaches 0

What is the graph getting closer & closer to but won't touch

8. Graph the rational function $g(x) = \frac{1}{(x-3)^2} + 1$ by finding all the asymptotes.

a. Vertical

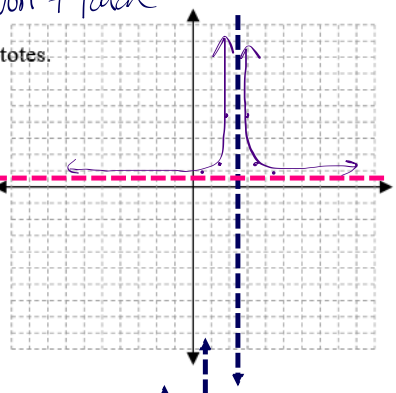
b. Horizontal

V.A: $x = h$ Right 3

$x = 3$ V.A

H.A $y = k$ up 1

$y = 1$ H.A



Parent $y = \frac{1}{x^2}$

x	y
-2	$\frac{1}{4}$
-1	1
$-\frac{1}{2}$	4
$\frac{1}{2}$	4
1	1
2	$\frac{1}{4}$

9. Graph the rational function $f(x) = \frac{4x}{x^2-1}$

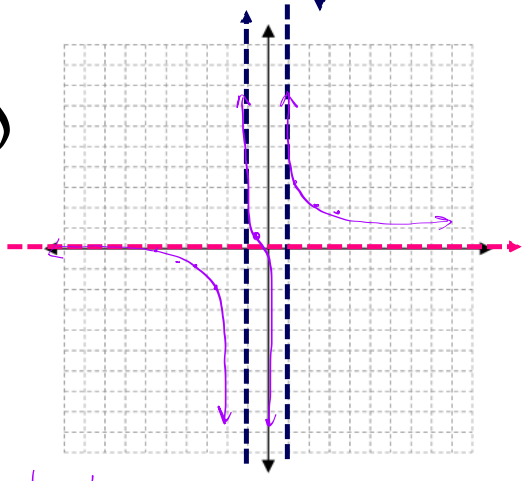
$\frac{4x}{(x+1)(x-1)}$

a. y-intercept Set $x = 0$ $(0, 0)$

b. x-intercept(s) Set Numerator = 0 Solve $(0, 0)$ $4x = 0$

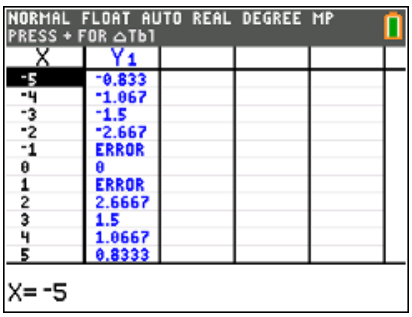
c. vertical asymptote(s) $x = 1$ $x = -1$

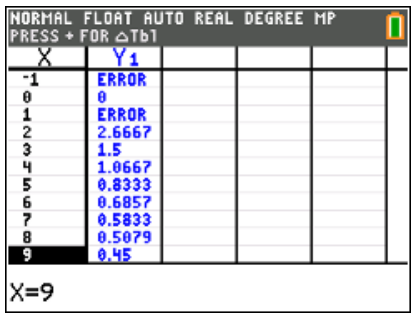
d. horizontal asymptote(s) OR slant asymptote $n < m$ $y = 0$ H.A.



e. any additional points necessary to graph the function.

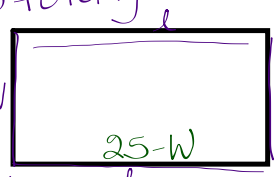
Put original problem in Calc and use table exact points





10. You have 50 yds of fencing to enclose a rectangular pasture. Find the dimensions of rectangle that will maximize the enclosed area. What would that Maximum area be? Do ALL 4 Steps and write a sentence for you answer

50 yds fencing



Vertex
Max

$A = l \cdot w$

$2w + 2l = 50$

get l by itself

$2w + 2l = 50$

$-2w \quad -2w$

$\frac{2l}{2} = \frac{50}{2} - \frac{2w}{2}$

$l = 25 - w$

$A = (25-w)w$

$A = 25w - w^2$

$A = -w^2 + 25w$

$\frac{-25}{-2}$

12.5 Width

length 25-12.5

12.5

Max Vertex $\left(\frac{-b}{2a}, P \leq C\right)$

↑ Width ↑ Max Area

To maximize the total area you would want a 12.5 x 12.5 yds Pasture the Max area would be 156.25 yds Squared.

11. A football is kicked, the nearest defensive player is 6 feet from the point of impact with the kicker's foot. The height of the punted football, f(x), in feet, can be modeled by $f(x) = -0.01x^2 + 1.18x + 2$

Where x is the balls horizontal distance, in feet, from the kickers foot and f(x) is the height of the football.

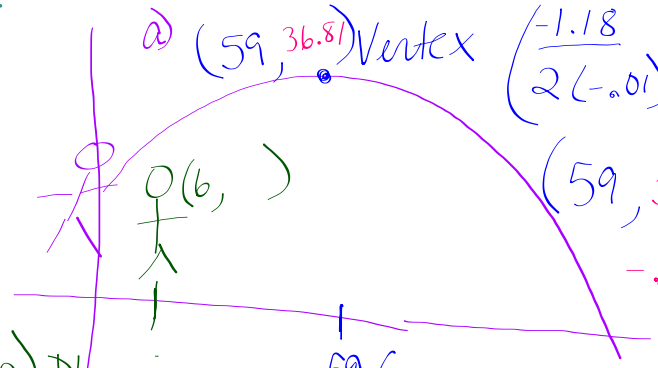
a. How high does the football get?

b. Can the defender block the punt?

c. How far down the field will it land assuming it isn't blocked and nobody catches it?

a) (59, 36.81) Vertex $\left(\frac{-1.18}{2(-.01)}, P \leq C\right)$

The football reaches a max height of 36.81 feet 59 feet from the kicker.



(59, 36.81)

$-.01(59)^2 + 1.18(59) + 2$

$-34.81 + 69.62 + 2$

36.81

b) Plug in 6 for X and see how high the ball is

$-.01(6)^2 + 1.18(6) + 2$

The football is 8.72 feet high 6 feet from him So if the defender Jumps he could block if punt I don't think he can Jump that high.

c) Set the equation equal to zero and Solve

$0 = -.01x^2 + 1.18x + 2$

I am going to use my Calculator to Solve

119.67 feet

If no one touches the punt it will land 119.67 feet from the Kicker.