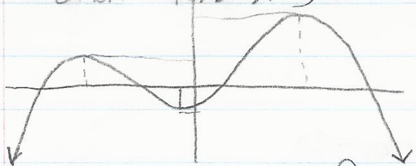
Keanu Vestil
Mr. Fox
PreCalculus Honors

9 A

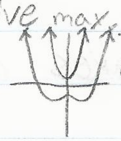
Chapter 1 and 2 Summary

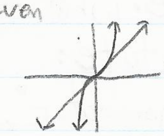
Relation: $y=x$
Function: $f(x)=x$ } Vertical Line Test

Horizontal Line Test: test if a function is "one-to-one"



Relative min.
Relative max. } Relative Extrema


even


odd

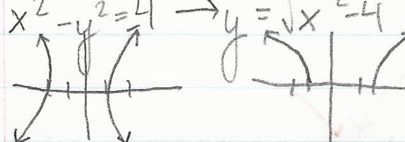
"One-to-One": both the original function, as well as the inverse function are valid functions.

$f(-x) \rightarrow$ simplify $\rightarrow$
- $f(x)$ = even
- $f(-x)$ = odd
- neither = no symmetry

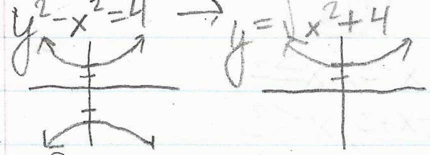
Mother Functions

$x^2+y^2=4 \rightarrow y=\sqrt{4-x^2}$

$x^2-y^2=4 \rightarrow y=\sqrt{x^2-4}$



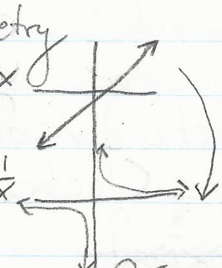
$y^2-x^2=4 \rightarrow y=\sqrt{x^2+4}$



$f(x)=x$

$f(x)=\frac{1}{x}$

reciprical function



$(f\circ g)(x) \rightarrow f(g(x))$

$D_{omain\ composite} = D_{simplified} \cap D_{inner\ function}$

Inverse Function: reflect across $y=x$
- find by replacing $f(x)$ (y) with x and simplify
- if $f(x)$ and $f^{-1}(x)$ are functions, "one-to-one" function

Transformations

$c\,f(x)$: vertical stretch
$f(cx)$: inverse horizontal stretch
$f(x)+c$: Vertical translation
$f(x+c)$: inverse horizontal translation
$|f(x)|$: everything above y-axis
$f(|x|)$: "inkblot" right half to left half
$-f(x)$: flip everything about x-axis.
$f(-x)$: flip everything about y-axis.

Varies...
- directly proportional: $y=kx$
- indirectly proportional: $y=\frac{k}{x}$
- jointly proportional: $y=k\cdot w\cdot k$

Vertex Form: $f(x)=a(x-h)^2+k$
Standard Form: $f(x)=ax^2+bx+c$
- vertex: $\left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$

End Behavior

↘↗ : Decr. → Incr.
↗↘ : Incr. → Decr.
↙↗ : Incr. → Incr.
↖↘ : Decr. → Decr.

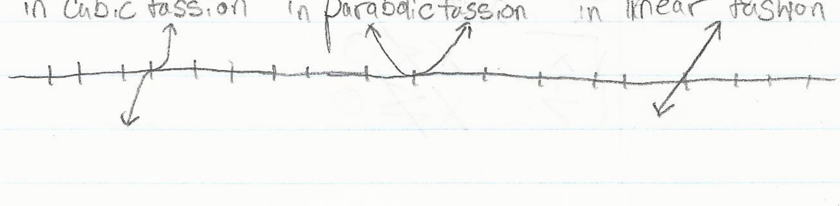
Multiplicity

$f(x)=(x+1)^3(x-2)^2(x+5)$

Cubic: passes through in cubic fassion

quadratic: "touches" in parabolic fassion

linear: passes trough in linear fashion



Parts of a rational function

Domain: find what satisfies all xs
 -for rational functions everything except what makes denominator $=0$
x-ints: Set equal to 0
y-int: set x to 0
Vertical Asymptote: what makes denominator $=0$
Horizontal Asymptote:
 if num° > denominator°, oblique asymptote (divide numerator by denominator)
 if num° = denominator°, ratio of lead coefficients
 if num° < denominator°, $y=0$

When using sythetic division, $\frac{p}{q}$ for possible solutions
P = Constant terms (factors), Q = Lead co-efficient (factors)
i.e. $\frac{9}{4} \rightarrow \frac{1, 3, 9}{1, 2, 4}$

$\frac{x}{\boxed{(x-4)}}$ vertical asymptote, $\frac{\boxed{x}(x-2)}{\boxed{x}(x+3)}$ hole ✓

$|a| \begin{cases} a \text{ if } a \geq 0 \\ -a \text{ if } a < 0 \end{cases}$ i.e. $f(x) = |x-3| = \begin{cases} x-3, & x \geq 3 \\ -x+3, & x < 3 \end{cases}$

P.S.
When testing for graphs, check relative behavior around asymptotes
When dividing a rational function for the oblique asymptote, disregard the remainder.
Interval notation:
 - ( ) not including (use with infinity and negative infinity)
 - [ ] including
 - $\cap$ "and" (intersection)
 - $\cup$ "or" (either)
Use synthetic substitution to test for solutions. If remainder $=0$, then its a solution.

$\frac{1}{x}$ $x \neq 0$
$\sqrt{x}$ $x \not< 0$
$\sqrt{\frac{1}{x}}$ $x \not\leq 0$