

Unit 1 Assignment #2 p102 1-23 odd

1) Function

3) NOT A Function



* Fails VLT

* More than one output for an input

5) Yes

7) No: Fails VLT

9) Domain: $(-\infty, \infty)$

11) Domain: $(-\infty, -3) \cup (-3, 1) \cup (1, \infty)$

13) Domain $(-\infty, 0) \cup (0, 5) \cup (5, \infty)$

15) $\sqrt{4-x} \rightarrow x \leq 4$

$$(x+1)(x^2+1)$$

$\downarrow$ $\downarrow$
 $x \neq -1$ $\text{never} = 0$

Domain: $(-\infty, -1) \cup (-1, 4]$

$\hookrightarrow$ closed bracket

17) $(-\infty, 10]$

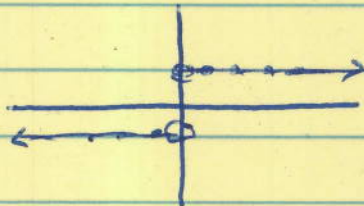
19) $(-\infty, -1) \cup [0, \infty)$

} use calc to visualize

21) Infinite Discontinuity @ $x=0$

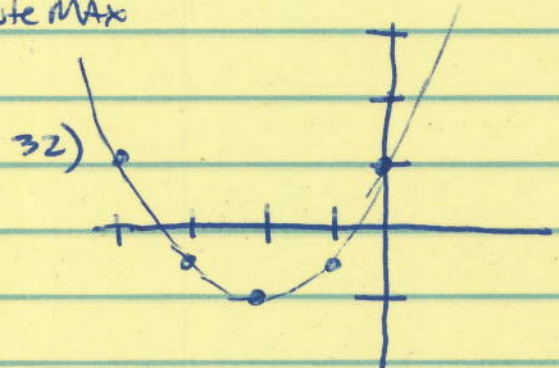


23) Jump Discontinuity @ $x=0$



Unit 1 Assignment #3 p102 #25-28, 32-34

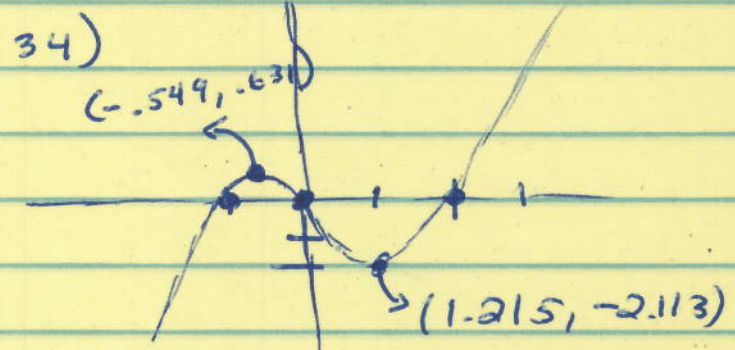
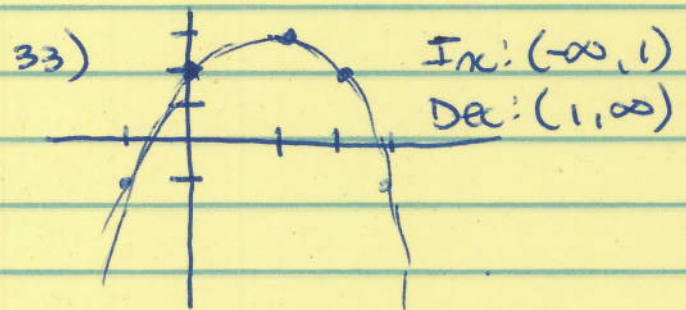
- 25) $(-1, 4)$ Local MAX
 $(2, 2)$ Local min
 $(5, 5)$ Local MAX AND Absolute MAX
Inc: $(-\infty, -1) \cup (2, 5)$
Dec: $(-1, 2) \cup (5, \infty)$



- 26) $(1, 2)$ Local min
 $(3, 3)$ Neither
 $(5, 7)$ Local MAX
Inc: $(1, 5)$
Dec: $(-\infty, 1) \cup (5, \infty)$

Inc: $(-2, \infty)$
Dec: $(-\infty, -2)$

- 27) $(-1, 3)$ Neither
 $(1, 5)$ Local MAX
 $(3, 3)$ Neither
 $(5, 1)$ Local min
Inc: $(-\infty, 1) \cup (5, \infty)$
Dec: $(1, 5)$



- 28) $(-1, 1)$ Local min
 $(1, 6)$ Local max
 $(3, 1)$ Local min
 $(5, 4)$ Local MAX
Inc: $(-1, 1) \cup (3, 5)$
Dec: $(-\infty, -1) \cup (1, 3) \cup (5, \infty)$

Inc: $(-\infty, -.549) \cup (1.215, \infty)$
Dec: $(-.549, 1.215)$

Unit 1 Assignment #4 p102-103 # 35-40, 47-54

35) Bounded 

36) Bounded Above 

37) Bounded Below 

38) Bounded Below 

39) Bounded 

40) Not Bounded 

$$47) f(x) = 2x^4$$

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

(since $f(x) = f(-x)$ Even)

$$48) g(x) = x^3$$

$$g(-x) = (-x)^3 = -x^3 \quad g(-x) \neq g(x) \text{ Not Even}$$

$$-g(x) = -x^3$$

(since $g(-x) = -g(x)$ ODD)

$$49) f(x) = \sqrt{x^2 + 2}$$

$$f(-x) = \sqrt{(-x)^2 + 2} = \sqrt{x^2 + 2}$$

(since $f(x) = f(-x)$ Even)

$$50) g(x) = \frac{3}{1+x^2}$$

(since $g(x) = g(-x)$
∴ Even)

$$g(-x) = \frac{3}{1+(-x)^2} = \frac{3}{1+x^2}$$

$$51) f(x) = -x^2 + .03x + 5$$

$$f(-x) = -(-x^2) + .03(-x) + 5$$

$$= -x^2 - .03x + 5$$

∴ not Even since $f(x) \neq f(-x)$

$$-f(x) = -(-x^2 + .03x + 5)$$

$$= x^2 - .03x - 5$$

∴ not odd since

$$f(-x) \neq -f(x)$$

∴ Neither

52) Neither

53) ODD

54) ODD

Same work as prior problems

Unit 1 Assignment #5 p 103 #55-61
No Calc: Use limits for End Behavior

55) V.A: $x=1$
H.A: $y=1$

$\lim_{x \rightarrow \pm\infty} f(x) = 1$



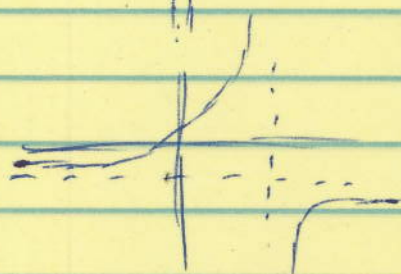
56) V.A: $x=0$
H.A: $y=1$

$\lim_{x \rightarrow \pm\infty} g(x) = 1$



57) V.A: $x=3$
H.A: $y=-1$

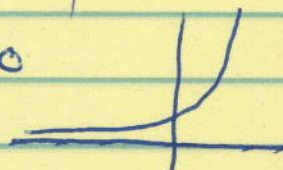
$\lim_{x \rightarrow \pm\infty} g(x) = -1$



58) V.A: None
H.A: $y=0$

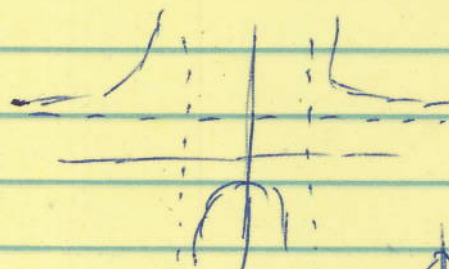
$\lim_{x \rightarrow \infty} g(x) = \infty$

$\lim_{x \rightarrow -\infty} g(x) = 0$



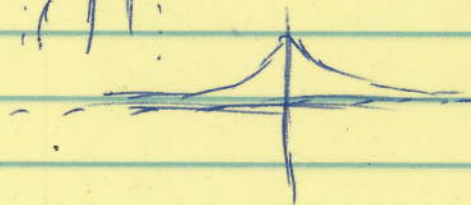
59) V.A: $x=\pm 1$
H.A: $y=1$

$\lim_{x \rightarrow \pm\infty} f(x) = 1$



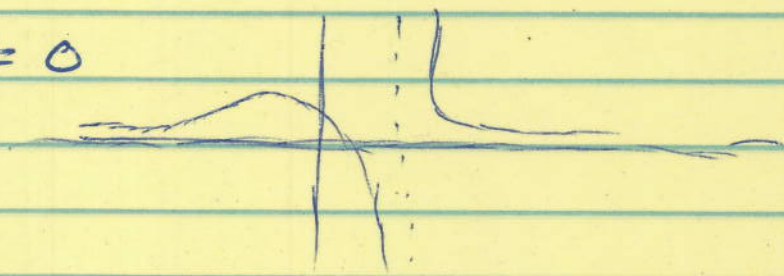
60) V.A: None
H.A: $y=0$

$\lim_{x \rightarrow \pm\infty} p(x) = 0$



61) V.A: $x=2$
H.A: $y=0$

$\lim_{x \rightarrow \pm\infty} g(x) = 0$



WS DAY #6

Honors Pre-Calculus
Unit 1 – Functions

Name _____
Date _____ Period _____

Analyzing Rational Functions Practice

Graph and analyze the following functions. Label all asymptotes. You may need to use a calculator in order to find the x-intercepts and values at the extrema.

1. $f(x) = \frac{3}{x}$

Domain: $(-\infty, 0) \cup (0, \infty)$

Range: $(-\infty, 0) \cup (0, \infty)$

Continuity: on its Domain

Decreasing Interval(s): $(-\infty, 0) \cup (0, \infty)$

Increasing Interval(s): —

Even/Odd Symmetry: odd

Bounded: —

Hole(s): —

Horizontal Asymptote(s): $y=0$

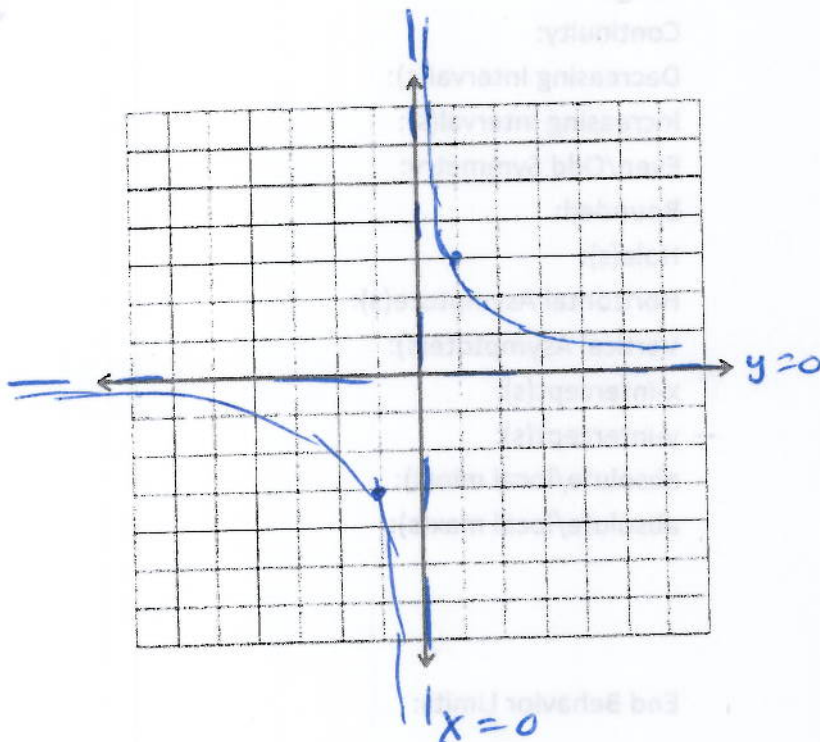
Vertical Asymptote(s): $x=0$

x-intercept(s): —

y-intercept(s): —

absolute/local min(s): —

absolute/local max(s): —



End Behavior Limits:

$$\lim_{x \rightarrow \pm\infty} f(x) = 0$$

Limits at Vertical Asymptotes:

$$\lim_{x \rightarrow 0^-} f(x) = -\infty \quad \lim_{x \rightarrow 0^+} f(x) = \infty$$

2. $g(x) = \frac{3}{x} + 2$

Domain: $(-\infty, 0) \cup (0, \infty)$
 Range: $(-\infty, 2) \cup (2, \infty)$
 Continuity: on Domain
 Decreasing Interval(s): $(-\infty, 0) \cup (0, \infty)$
 Increasing Interval(s): —
 Even/Odd Symmetry: —
 Bounded: —
 Hole(s): —
 Horizontal Asymptote(s): $y = 2$
 Vertical Asymptote(s): $x = 0$
 x-intercept(s): $(-\frac{3}{2}, 0)$
 y-intercept(s): —
 absolute/local min(s): —
 absolute/local max(s): —

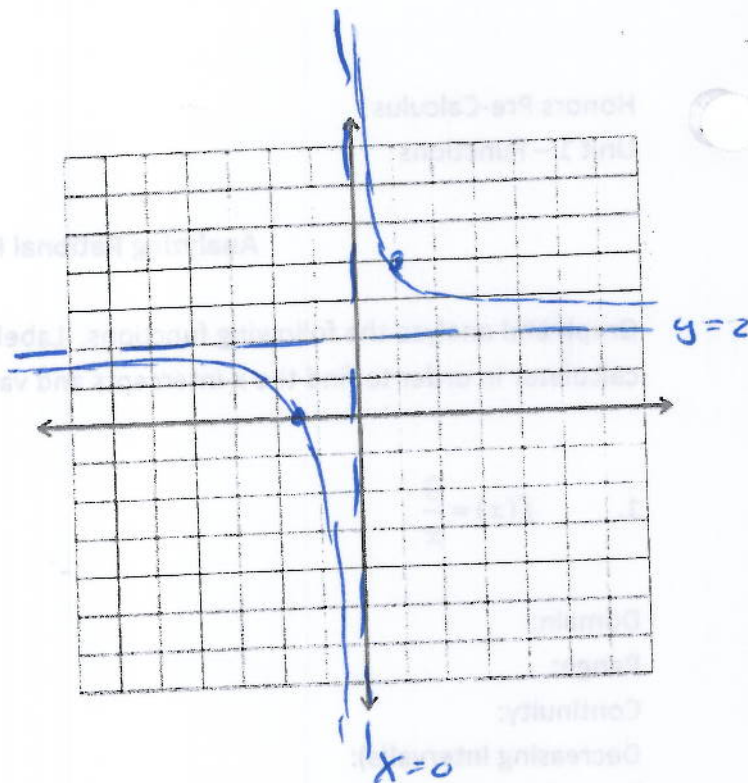
End Behavior Limits:

$$\lim_{x \rightarrow \pm\infty} g(x) = 2$$

Limits at Vertical Asymptotes:

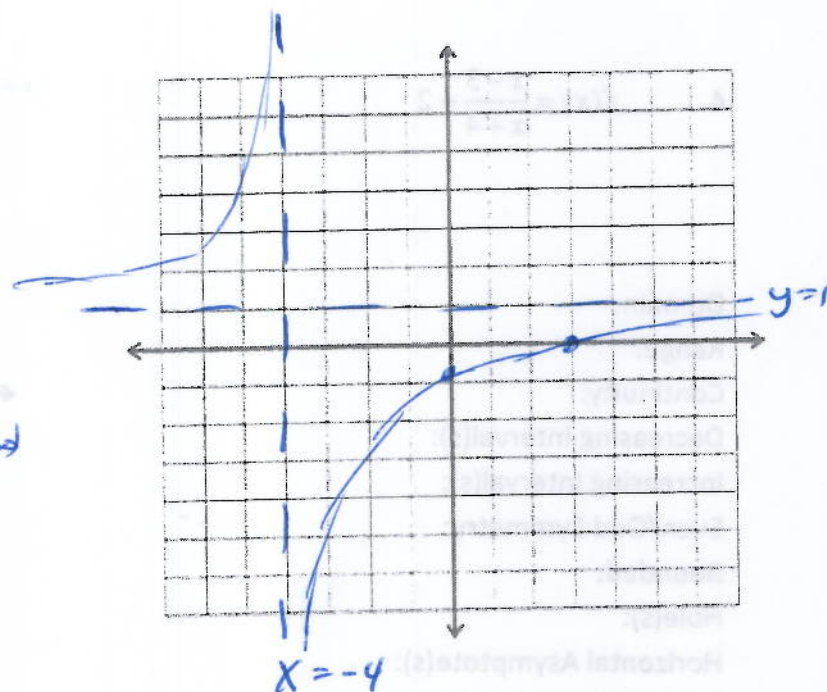
$$\lim_{x \rightarrow 0^-} g(x) = -\infty$$

$$\lim_{x \rightarrow 0^+} g(x) = \infty$$



3. $h(x) = \frac{x-3}{x+4}$

Domain: $(-\infty, -4) \cup (-4, \infty)$
 Range: $(-\infty, 1) \cup (1, \infty)$
 Continuity: on Domain
 Decreasing Interval(s): —
 Increasing Interval(s): $(-\infty, -4) \cup (-4, \infty)$
 Even/Odd Symmetry: —
 Bounded: —
 Hole(s): —
 Horizontal Asymptote(s): $y=1$
 Vertical Asymptote(s): $x=-4$
 x-intercept(s): $(3, 0)$
 y-intercept(s): $(0, -\frac{3}{4})$
 absolute/local min(s): —
 absolute/local max(s): —



End Behavior Limits: $\lim_{x \rightarrow \pm \infty} h(x) = 1$

Limits at Vertical Asymptotes:

$$\lim_{x \rightarrow -4^-} h(x) = \infty$$

$$\lim_{x \rightarrow -4^+} h(x) = -\infty$$

4. $f(x) = \frac{x-3}{x+4} - 2$

Domain: $(-\infty, -4) \cup (-4, \infty)$

Range: $(-\infty, -1) \cup (-1, \infty)$

Continuity: on Domain

Decreasing Interval(s): ---

Increasing Interval(s): $(-\infty, -4) \cup (-4, \infty)$

Even/Odd Symmetry: ---

Bounded: ---

Hole(s): ---

Horizontal Asymptote(s): $y = -1$

Vertical Asymptote(s): $x = -4$

x-intercept(s): $(-11, 0)$

y-intercept(s): $(0, -\frac{5}{4})$

absolute/local min(s): ---

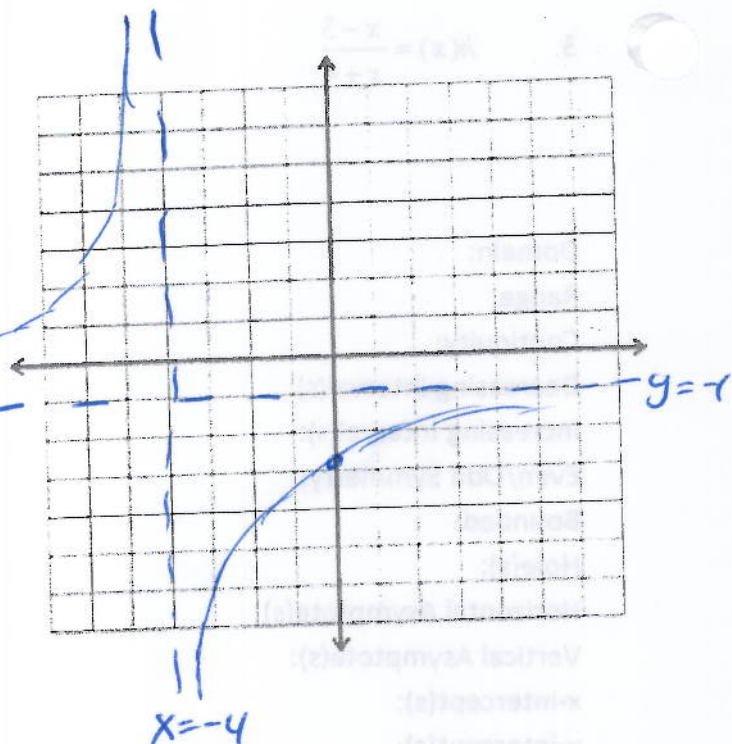
absolute/local max(s): ---

End Behavior Limits: $\lim_{x \rightarrow \pm \infty} f(x) = -1$

Limits at Vertical Asymptotes:

$$\lim_{x \rightarrow -4^-} f(x) = \infty$$

$$\lim_{x \rightarrow -4^+} f(x) = -\infty$$



$$\begin{aligned} \frac{x-3}{x+4} &= 2 \\ x-3 &= 2x+8 \\ -11 &= x \end{aligned} \quad \begin{aligned} \frac{y-2}{y-1} &= 2 \\ \frac{-3}{4}-2 &= \frac{-3}{4}-\frac{8}{4} \\ \frac{-3-8}{4} &= \frac{-11}{4} \end{aligned}$$

5. $g(x) = \frac{2x+1}{x-1}$

Domain: $(-\infty, 1) \cup (1, \infty)$

Range: $(-\infty, 2) \cup (2, \infty)$

Continuity: on Domain

Decreasing Interval(s): $(-\infty, 1) \cup (1, \infty)$

Increasing Interval(s): —

Even/Odd Symmetry: —

Bounded: —

Hole(s): —

Horizontal Asymptote(s): $y = 2$

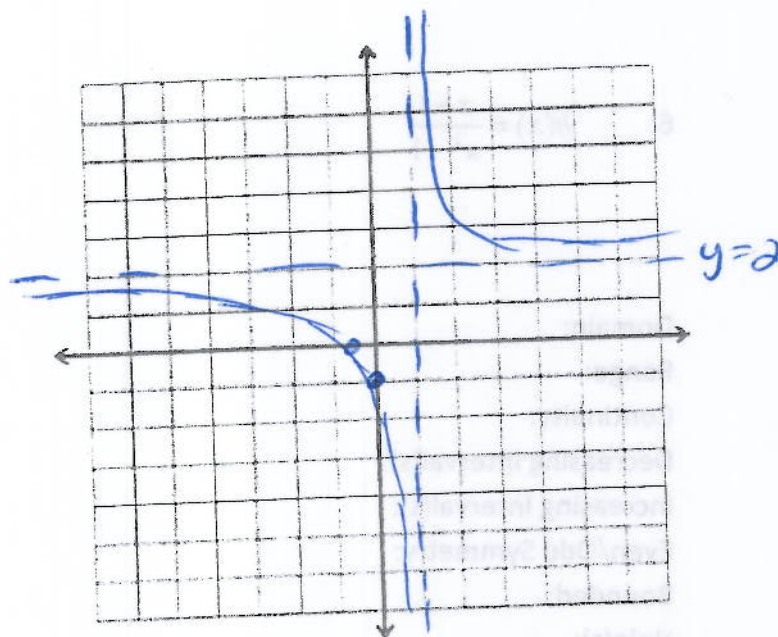
Vertical Asymptote(s): $x = 1$

x-intercept(s): $(-\frac{1}{2}, 0)$

y-intercept(s): $(0, -1)$

absolute/local min(s): —

absolute/local max(s): —



End Behavior Limits:

$$\lim_{x \rightarrow \pm \infty} g(x) = 2$$

Limits at Vertical Asymptotes:

$$\lim_{x \rightarrow 1^-} g(x) = -\infty$$

$$\lim_{x \rightarrow 1^+} g(x) = \infty$$

6.
$$h(x) = \frac{x+1}{x^2-1} = \frac{x+1}{(x+1)(x-1)} = \frac{1}{x-1}$$

Domain: $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

Range: $(-\infty, -\frac{1}{2}) \cup (-\frac{1}{2}, 0) \cup (0, \infty)$

Continuity: on domain

Decreasing Interval(s): $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

Increasing Interval(s): —

Even/Odd Symmetry: —

Bounded: —

Hole(s): $(-1, -\frac{1}{2})$

Horizontal Asymptote(s): $y=0$

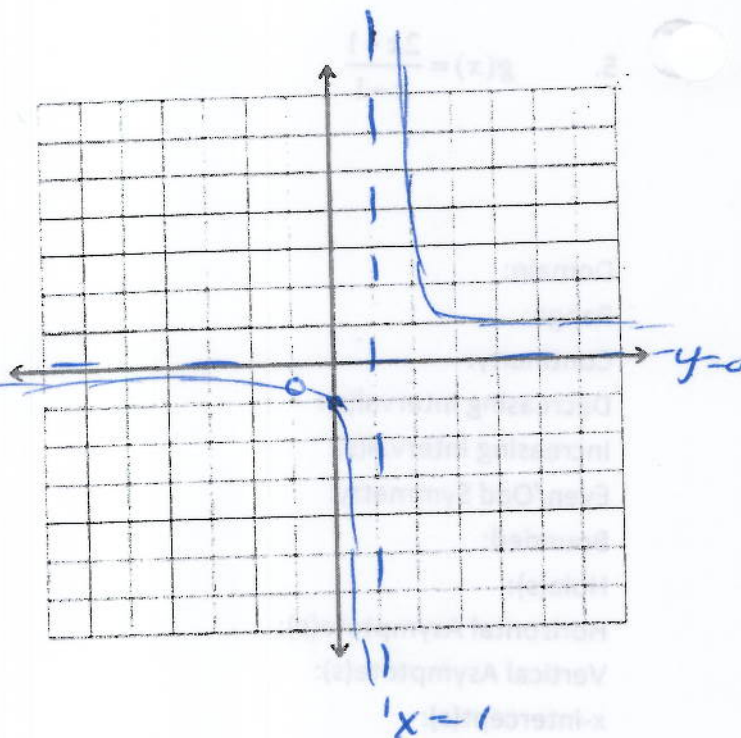
Vertical Asymptote(s): $x=1$

x-intercept(s): —

y-intercept(s): $(0, -1)$

absolute/local min(s): —

absolute/local max(s): —



End Behavior Limits:

$$\lim_{x \rightarrow \pm \infty} h(x) = 0$$

Limits at Vertical Asymptotes:

$$\lim_{x \rightarrow 1^-} h(x) = -\infty$$

$$\lim_{x \rightarrow 1^+} h(x) = \infty$$

7. $f(x) = \frac{x^2 - 1}{x + 1} = \frac{(x+1)(x-1)}{x+1} = x-1$

Domain: $(-\infty, -1) \cup (-1, \infty)$

Range: $(-\infty, -2) \cup (-2, \infty)$

Continuity: on Domain

Decreasing Interval(s): $-$

Increasing Interval(s): $(-\infty, -1) \cup (-1, \infty)$

Even/Odd Symmetry: $-$

Bounded: $-$

Hole(s): $(-1, -2)$

Horizontal Asymptote(s): $-$

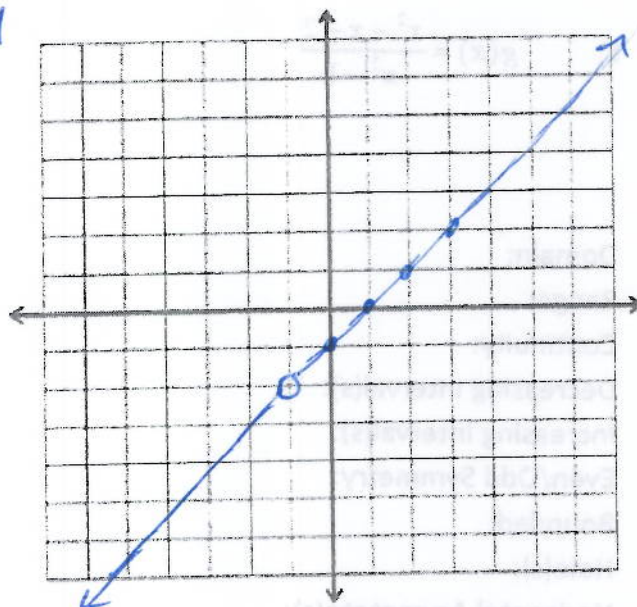
Vertical Asymptote(s): $-$

x-intercept(s): $(1, 0)$

y-intercept(s): $(0, -1)$

absolute/local min(s): $-$

absolute/local max(s): $-$



End Behavior Limits:

$$\lim_{x \rightarrow \infty} f(x) = \infty$$

$$\lim_{x \rightarrow -\infty} f(x) = -\infty$$

Limits at Vertical Asymptotes:

None

8.
$$g(x) = \frac{x^2 - x - 2}{x^2 - 1} = \frac{(x-2)(x+1)}{(x-1)(x+1)}$$

$$= \frac{x-2}{x-1}$$

Domain: $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

Range: $(-\infty, 1) \cup (1, \frac{3}{2}) \cup (\frac{3}{2}, \infty)$

Continuity: on Domain

Decreasing Interval(s): —

Increasing Interval(s): $(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$

Even/Odd Symmetry: —

Bounded: —

Hole(s): $(-1, \frac{3}{2})$

Horizontal Asymptote(s): $y = 1$

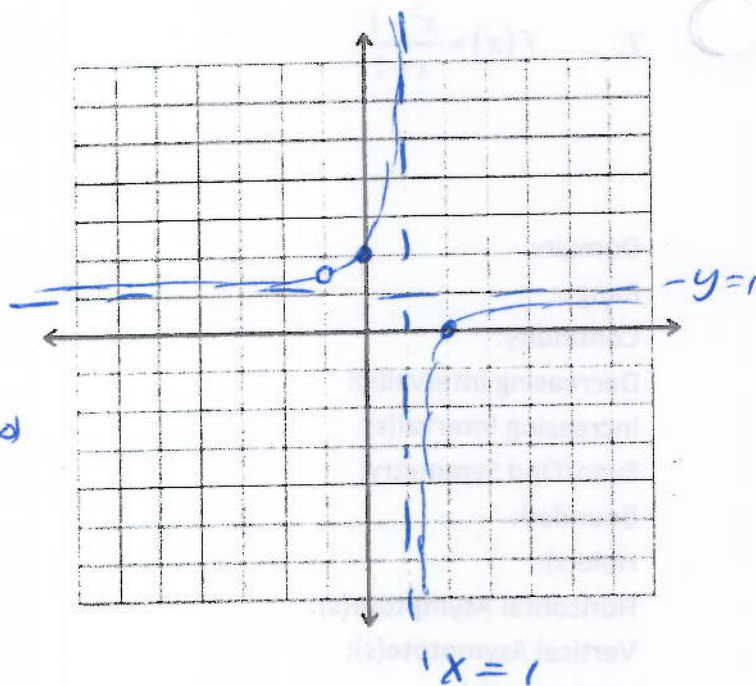
Vertical Asymptote(s): $x = 1$

x-intercept(s): $(2, 0)$

y-intercept(s): $(0, 2)$

absolute/local min(s): —

absolute/local max(s): —



End Behavior Limits:

$$\lim_{x \rightarrow \pm \infty} g(x) = 1$$

Limits at Vertical Asymptotes:

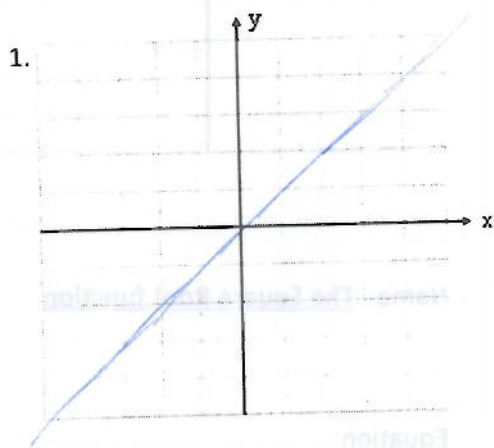
$$\lim_{x \rightarrow 1^-} g(x) = \infty$$

$$\lim_{x \rightarrow 1^+} g(x) = -\infty$$

Classwork for Assignment # 7

Honors PreCalculus
Unit 1 – Twelve Basic Functions

Name: _____
Date: _____ Period: _____



Name: Linear Function

Equation: $y = x$

Domain: $\mathbb{R}$

Range: $\mathbb{R}$

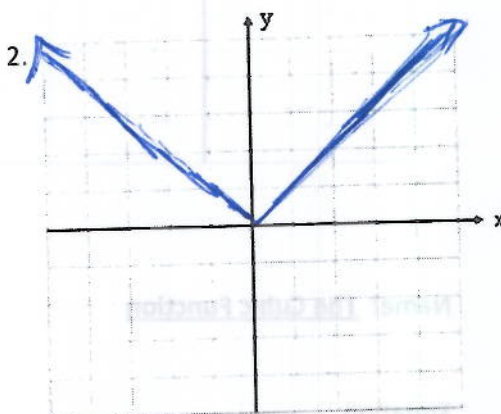
Odd/Even: ODD

Continuous: $\mathbb{R}$

Boundedness: none

Increasing: $(-\infty, \infty)$

Decreasing: —



Name: Absolute Value Function

Equation: $y = |x|$

Domain: $\mathbb{R}$

Range: $[0, \infty)$

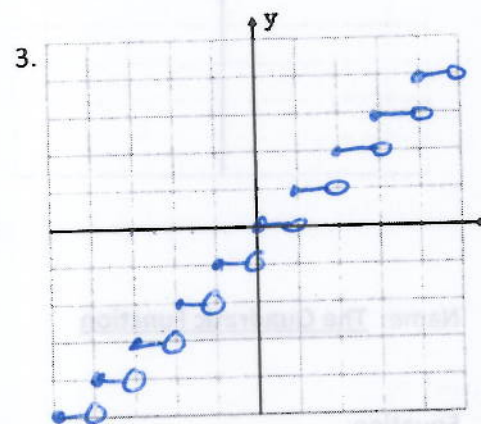
Odd/Even: Even

Continuous: $\mathbb{R}$

Boundedness: Below

Increasing: $(0, \infty)$

Decreasing: $(-\infty, 0)$



Name: The Greatest Integer

Equation: $y = \text{int}(x)$

Domain: $\mathbb{R}$

Range: All integers or $\mathbb{Z}$

Odd/Even: neither

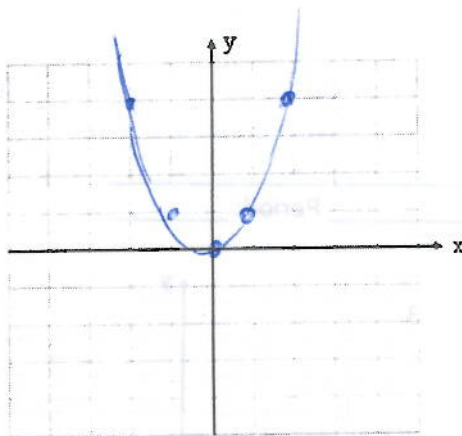
Continuous: Jump Discontinuity

Boundedness: None

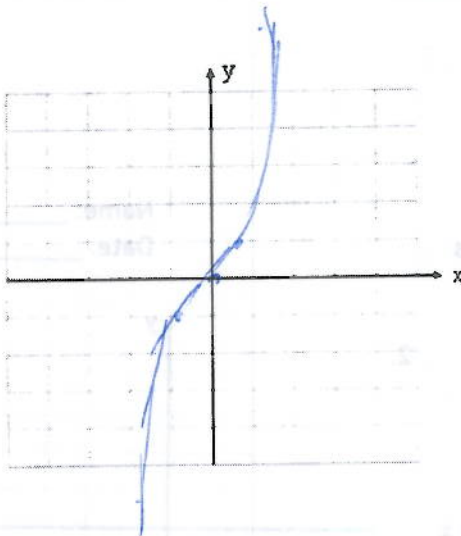
Increasing: —

Decreasing: —

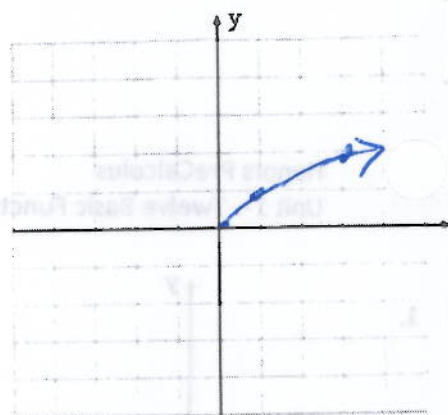
4.

Name: The Quadratic FunctionEquation: $y = x^2$ Domain: $\mathbb{R}$ Range: $[0, \infty)$ Odd/Even: EvenContinuous: $\mathbb{R}$ Boundedness: BelowIncreasing: $(0, \infty)$ Decreasing: $(-\infty, 0)$

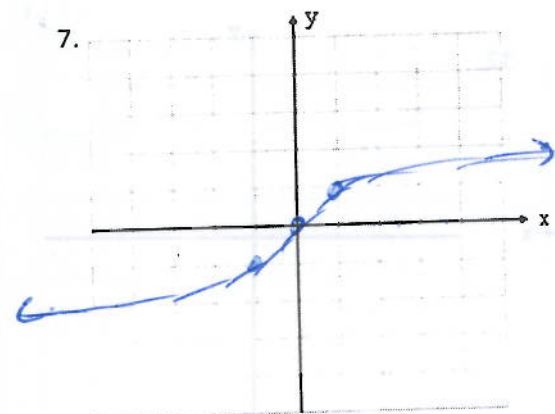
5.

Name: The Cubic FunctionEquation: $y = x^3$ Domain: $\mathbb{R}$ Range: $\mathbb{R}$ Odd/Even: ODDContinuous: $\mathbb{R}$ Boundedness: NoneIncreasing: $(-\infty, \infty)$ Decreasing: —

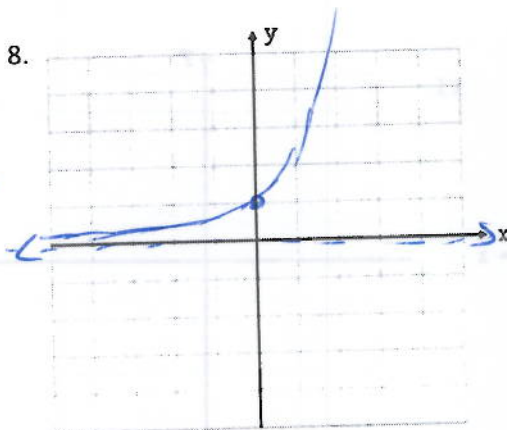
6.

Name: The Square Root functionEquation: $y = \sqrt{x}$ Domain: $[0, \infty)$ Range: $[0, \infty)$ Odd/Even: NeitherContinuous: on its domainBoundedness: BelowIncreasing: $(0, \infty)$ Decreasing: —

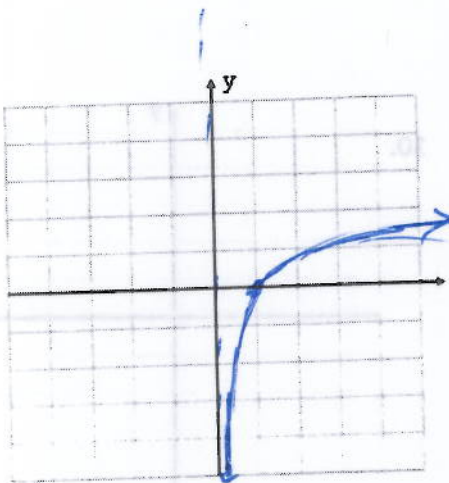
7.

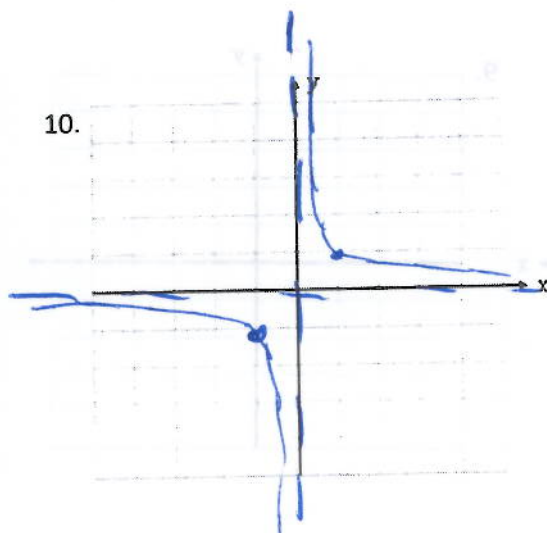


8.



9.

Name: Cube Root FunctionEquation: $y = \sqrt[3]{x}$ Domain: $\mathbb{R}$ Range: $\mathbb{R}$ Odd/Even: ODDContinuous: $\mathbb{R}$ Boundedness: noneIncreasing: $(-\infty, \infty)$ Decreasing: —Name: Exponential FunctionEquation: $y = e^x$ Domain: $\mathbb{R}$ Range: $(0, \infty)$ Odd/Even: neitherContinuous: $\mathbb{R}$ Boundedness: BelowIncreasing: $(-\infty, \infty)$ Decreasing: —H.A: $y = 0$ Name: Logarithmic FunctionEquation: $y = \ln x$ Domain: $(0, \infty)$ Range: $\mathbb{R}$ Odd/Even: neitherContinuous: on DomainBoundedness: noneIncreasing: $(-\infty, \infty)$ Decreasing: —V.A: $x = 0$



Name: The Reciprocal Function

Equation: $y = \frac{1}{x}$

Domain: $(-\infty, 0) \cup (0, \infty)$

Range: $(-\infty, 0) \cup (0, \infty)$

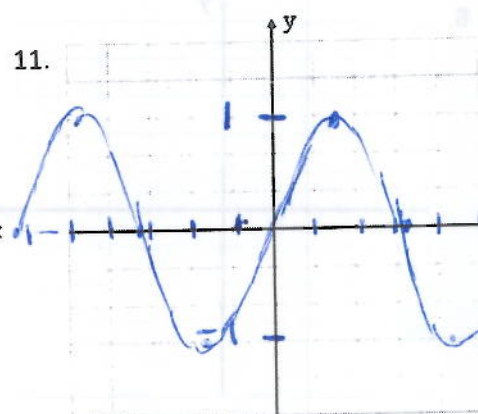
Odd/Even: ODD

→ infinite discontinuity @ $x=0$
Continuous: on its domain

Boundedness: none

Increasing: —

Decreasing: $(-\infty, 0) \cup (0, \infty)$



Name: The Sine Function

Equation: $y = \sin x$

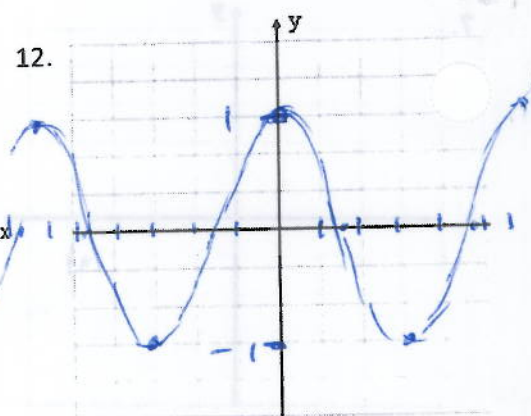
Domain: $\mathbb{R}$

Range: $[-1, 1]$

Odd/Even: ODD

Continuous: on $\mathbb{R}$

Boundedness: Bounded



Name: The Cosine Function

Equation: $y = \cos x$

Domain: $\mathbb{R}$

Range: $[-1, 1]$

Odd/Even: Even

Continuous: on $\mathbb{R}$

Boundedness: Bounded

Unit 1 Assignment #7 p113 #19-28

19) $y = x$
 $y = x^3$
 $y = \frac{1}{x}$
 $y = \sin x$

20) $y = x$
 $y = x^3$
 $y = \sqrt{x}$
 $y = e^x$

$y = \ln x$
 $y = \frac{1}{1+e^x}$

21) $y = x^2$
 $y = \frac{1}{x}$
 $y = |x|$

23) $y = \frac{1}{x}$
 $y = e^x$
 $y = \frac{1}{1+e^x}$

24) $y = x$
 $y = x^3$
 $y = \ln x$

25) $y = \frac{1}{x}$
 $y = \sin x$
 $y = \cos x$
 $y = \frac{1}{1+e^x}$

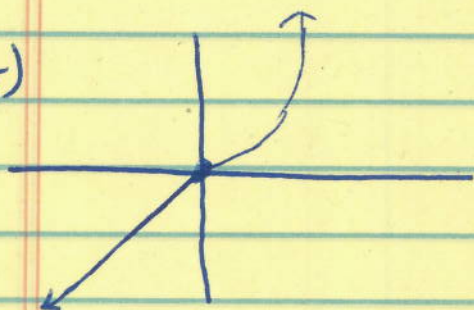
26) $y = x$
 $y = x^3$
 $y = \ln(x)$

27) $y = x$
 $y = x^3$
 $y = \frac{1}{x}$
 $y = \sin x$

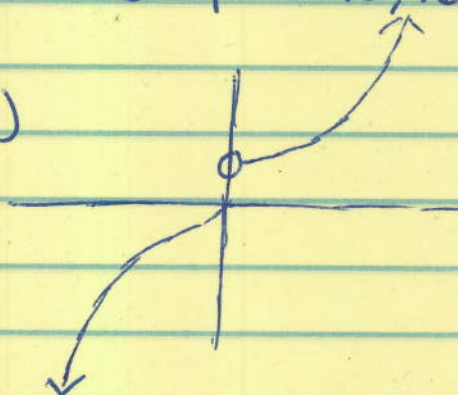
28) $y = \sin x$
 $y = \cos x$

Unit 1 Assignment #8 p114 45, 46, 48, 52, 62, 65

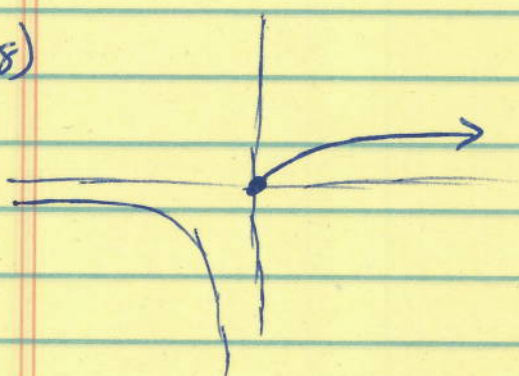
45)



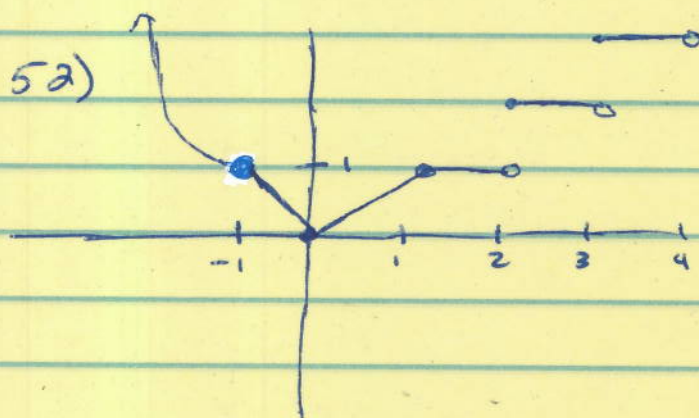
46)



48)



52)



62) C

65) (A) Even

ex) $x^3 - x = x^4$

(B) Even

ex) $x^2 - x^4 = x^6$

(C) Odd

ex) $x - x^2 = x^3$