Day 1 Homework

For each of the rational functions find: **a. domain** **b. x-intercept(s)** **c. y-intercept**
Graph #8 and #10 with at least 5 EXACT points.

1. $f(x)=\dfrac{x^2+x-2}{x^2-x-6}$ $\dfrac{\cancel{(x+2)}(x-1)}{\cancel{(x+2)}(x-3)}$

hole at $x=-2$.. we'll discuss today

Domain: $(-\infty,-2)\cup(-2,3)\cup(3,\infty)$
x-intercept(s): $(1,0)$
y-intercept: $(0,1/3)$

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

Domain: $(-\infty,-1)\cup(-1,1)\cup(1,\infty)$
x-intercept(s): $(0,0)$
y-intercept: $(0,0)$

3. $h(x)=\dfrac{\sqrt{9-x^2}}{x-2}=\dfrac{\sqrt{(3-x)(3+x)}}{x-2}$ $x\neq 2$

-3 2 3

Domain: $[-3,2)\cup(2,3]$
x-intercept(s): $(-3,0)$ and $(3,0)$
y-intercept: $(0,-3/2)$

4. $g(x)=\dfrac{\sqrt{3-x}}{(x+4)(x^2+4)}$

-4 3

Domain: $(-\infty,-4)\cup(-4,3]$
x-intercept(s): $(3,0)$
y-intercept: $(0,\sqrt{3}/16)$

5. $f(x)=\dfrac{x^2+x-12}{3x^2-27}=\dfrac{(x+4)\cancel{(x-3)}}{3(x+3)\cancel{(x-3)}}$ $3(x^2-9)$

hole... we'll discuss today in notes

Domain: $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$
x-intercept(s): $(-4,0)$
y-intercept: $(0,4/9)$ $-12/27$

6. $f(x)=\dfrac{1}{x}+\dfrac{6}{x-2}$

$0=x(x-2)\cdot\frac{1}{x}+\frac{6}{x-2}\cdot x(x-2) \to 0=x-2+6x$
$2=7x$
$2/7=x$

Domain: $(-\infty,0)\cup(0,2)\cup(2,\infty)$
x-intercept(s): $(2/7,0)$
y-intercept: none

$y=\dfrac{1}{0}+\dfrac{6}{0-2}$ undefined

7. $f(x)=\sqrt{x^2-9x+20}$ $(x-5)(x-4)$

4 5

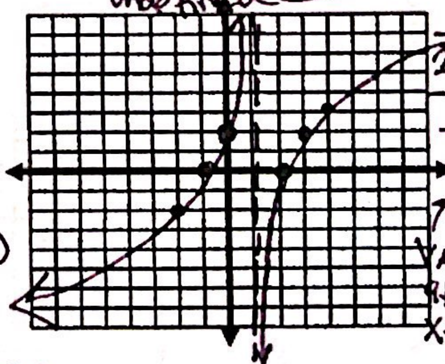
Domain: $(-\infty,4]\cup[5,\infty)$
x-intercept(s): $(4,0)$ and $(5,0)$
y-intercept: $(0,2\sqrt{5})$ $(0,\sqrt{20})$ $\sqrt{4}\sqrt{5}$

8. $f(x)=\dfrac{x^2-x-2}{x-1}$ $\dfrac{(x-2)(x+1)}{x-1}$

VA: $x=1$

Domain: $(-\infty,1)\cup(1,\infty)$
x-intercept(s): $(-1,0)$ and $(2,0)$
y-intercept: $(0,2)$

Graph #8



x	$f(x)$
-2	-2
-1	0
0	2
1	
2	0
3	2
4	10/3

VA at $x=1$

9. $f(x)=\dfrac{x^2-9}{x^2-2x-3}=\dfrac{\cancel{(x-3)}(x+3)}{\cancel{(x-3)}(x+1)}$

hole at $x=3$ we'll discuss it more today

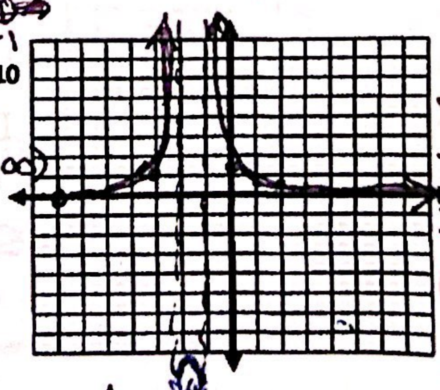
Domain: $(-\infty,-1)\cup(-1,3)\cup(3,\infty)$
x-intercept(s): $(-3,0)$
y-intercept: $(0,3)$

10. $f(x)=\dfrac{\sqrt{x+7}}{x^2+3x+2}$ $(x+2)(x+1)$

-7 -2 -1

Domain: $[-7,-2)\cup(-2,-1)\cup(-1,\infty)$
x-intercept(s): $(-7,0)$
y-intercept: $(0,\sqrt{7}/2)$

Graph #10



x	$f(x)$
-7	0
-3	1
-3/2	
-1	
0	$\sqrt{7}/2$
2	1/2

VA at $x=-2$ and -1

p.98 # 9-15 odd, 16, 21, 23

Homework Day 2

In Exercises 9-23, graph each function including x and y intercepts and give the domain. If the function is discontinuous, state the discontinuity and tell whether it is removable or nonremovable.

$0 = 3x - 1$

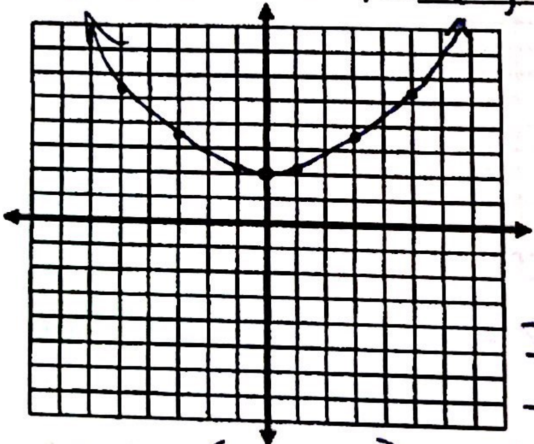
9. $f(x)=\sqrt{x^2+4}$

x-int: none $0^2 = \sqrt{x^2+4}^2$

y-int: (0, 2) $\pm\sqrt{-4} = \sqrt{x^2}$

imag

no domain restrictions either



-3	3.6
-1	2.24
0	2
1	2.24
3	3.6

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

Discontinuities: none

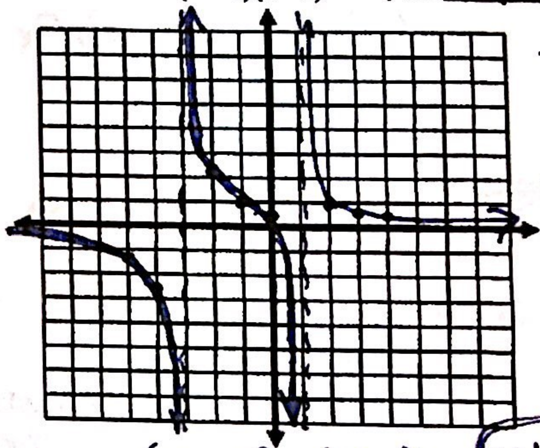
Removable / Nonremovable

11. $f(x)=\dfrac{3x-1}{(x+3)(x-1)}$

x-int: (1/3, 0)

y-int: (0, 1/3)

$\dfrac{3\cdot 0-1}{(0+3)(0-1)} =$



-5	-1.3	
-4	-2.6	
-3		
-2	7/3	-7/(1.
-1	1	-4/(2.
0	1/3	
1	—	

VA: x=-3, x=1

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

Discontinuities: yes

Removable / Nonremovable

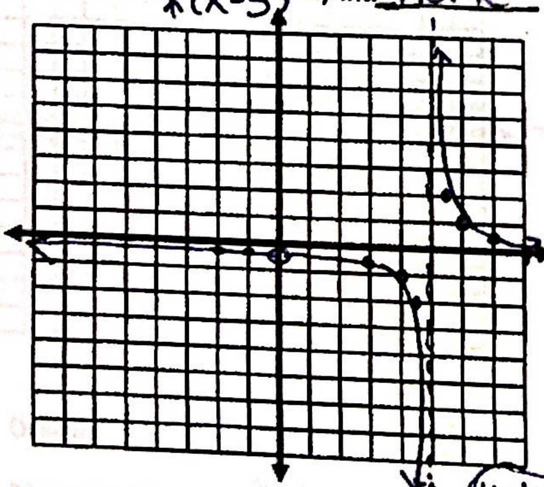
VA at x=-3, x=1

13. $g(x)=\dfrac{\cancel{x}}{x^2-5x} = \dfrac{1}{x-5}$

$\cancel{x}(x-5)$

x-int: none

y-int: none



-2	-1/7
-1	-1/6
0	
3	-1/2
4	-1
5	—
6	1
7	1/2

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

Hole at (0, -1/5)

VA: x=5

Discontinuities: yes

Removable / Nonremovable

Hole at (0, -1/5)   VA x=5

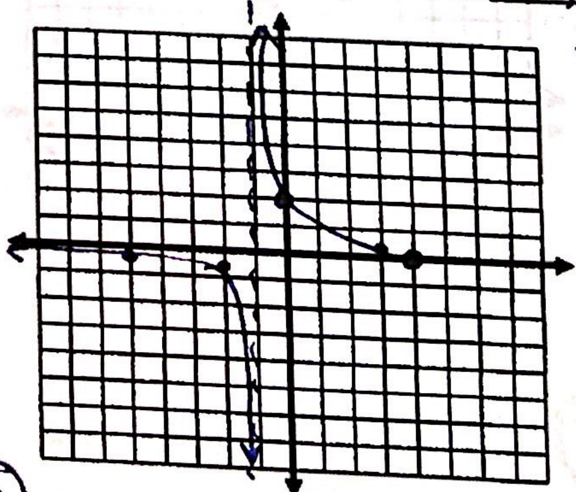
15. $h(x)=\dfrac{\sqrt{4-x}}{(x+1)(x^2+1)}$

$0=\sqrt{4-x}$

x-int: (4, 0)

y-int: (0, 2)

$\dfrac{\sqrt{4}}{(1)(1)}$



-5		$\frac{\sqrt{9}}{(-}$
-1	—	
0	2	
3	1/40	1/(4
4	0	

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

VA: x=-1
No Holes

Discontinuities: yes

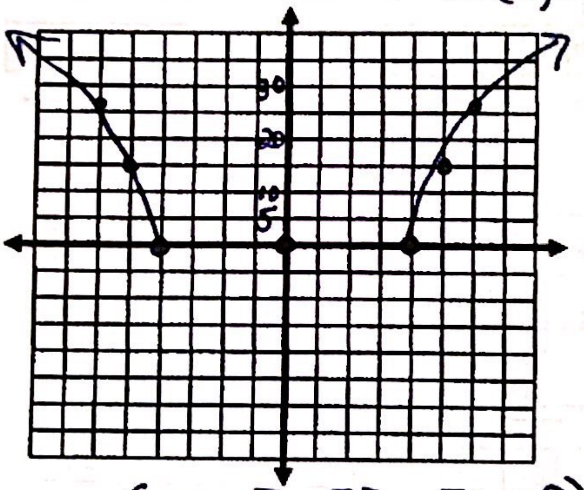
Removable / Nonremovable

V.A. at x=-1

16. $f(x)=\sqrt{x^4-16x^2}$

x-int: (-4,0), (0,0), (4,0)

y-int: (0,0)

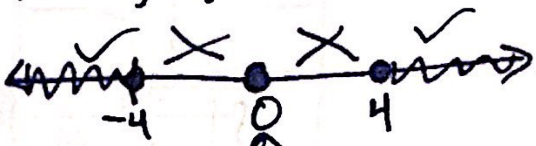


$\sqrt{x^2(x^2-16)}$

$\sqrt{x^2(x-4)(x+4)}$

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

$x=0,4,-4$



Domain: $(-\infty,-4]\cup[0]\cup[4,\infty)$

Discontinuities: None

Removable / Nonremovable

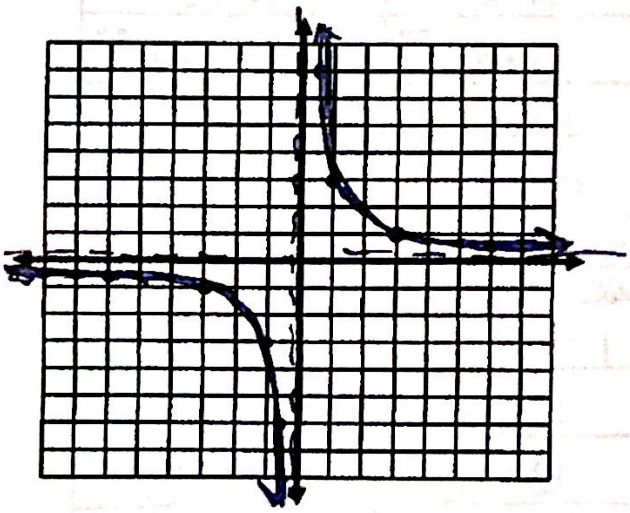
* The graph is discontinuous but does not have a hole, VA or jumpdiscontinuity

* stand alone point * WATCH OUT here !

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

x-int: none

y-int: none



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

Discontinuities: yes

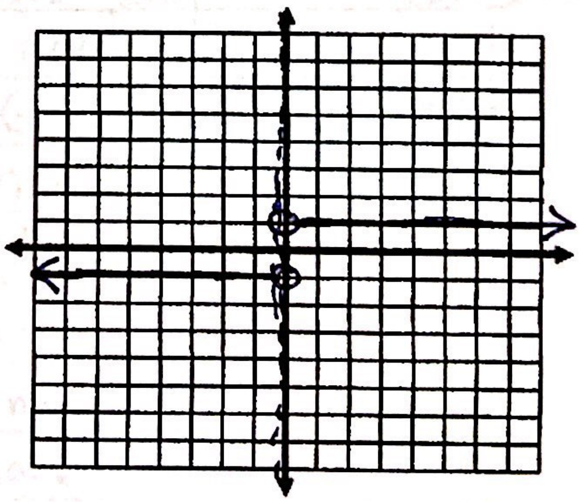
Removable / Nonremovable

VA at $x=0$

23. $f(x)=\frac{|x|}{x}$

x-int: none

y-int: none



location of VA: $x=0$

x	y
-3	-1
-2	-1
-1	-1
0	—
1	1
2	1
3	1

VA $x=0$

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

Discontinuities: yes

Removable / Nonremovable

VA at $x=0$

Asymptote Lab Classwork Day 3

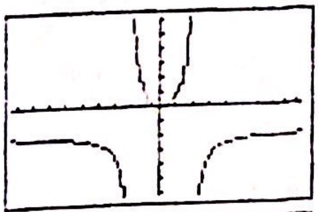
PRE – CALCULUS NAME

Graphing Calculator Asymptote LAB

Enter equations in Y_1
Set window as indicated

Plot1 Plot2 Plot3
\Y1 ■ (2X²)/(4−X²)
\Y2 =
\Y3 =
\Y4 =
\Y5 =
\Y6 =

WINDOW
Xmin=−9.4
Xmax=9.4
Xscl=1
Ymin=−6.2
Ymax=6.2
Yscl=1
Xres=1



X	Y1	
−2.003	−668.2	very small
−2.002	−1002	
−2.001	−2002	
−2	ERROR	ERROR
−1.999	1998.5	very large
−1.998	998.5	
−1.997	665.17	
X=−2		

X	Y1
−300	−2
−200	−2
−100	−2.001
0	0
100	−2.001
200	−2
300	−2
X=0	

Flattens to $y=-2$

$\boxed{H.A.\ y=-2}$

Examine behavior of horizontal and vertical asymptotes using features of the table.

In table, $\Delta Tbl = 0.001$ → $\boxed{V.A.\ x=-2}$

In table $\Delta tbl = 100$

Examine and write equations for the horizontal asymptotes, vertical asymptotes or holes in each of the functions below. If none exist, write none. Look for patterns in the types of asymptotes that occur so you can answer the questions on the next page.

1. $f(X)=\frac{3X^2-1}{2X^2+1}$	2. $f(x)=\frac{3X}{X^2+1}$	3. $f(x)=\frac{x^2-4}{x+2}=\frac{(x+2)(x-2)}{\cancel{x+2}}$	4. $f(x)=\frac{x+2}{x^2-4}=\frac{\cancel{x+2}}{(\cancel{x+2})(x-2)}=\frac{1}{x-2}$
v.a none	v.a none	v.a none	v.a $x=2$
hole: none	hole: none	hole: $(-2,-4)$	hole: $(-2,-1/4)$
h.a $y=3/2$	h.a $y=0$	h.a none	h.a $y=0$
5. $f(x)=\frac{x}{x^2-9}=\frac{x}{(x-3)(x+3)}$	6. $f(x)=\frac{5x^2-9}{3x^2-3}=\frac{5x^2-9}{3(x+1)(x-1)}$	7. $f(x)=\frac{3x^4}{x^2-16}=\frac{3x^4}{(x+4)(x-4)}$	8. $f(x)=\frac{x^3+1}{x+3}$
v.a $x=-3;x=3$	v.a $x=-1;x=1$	v.a $x=-4;x=4$	v.a $x=-3$
hole: none	hole: none	hole: none	hole: none
h.a $y=0$	h.a $y=5/3$	h.a none	h.a none
9. $f(x)=\frac{4x^3-3x^2+2x}{x^3-8}$	10. $f(x)=\frac{4x^2-12x+9}{(2x+3)^2}$	11. $f(x)=\frac{x^2-6x+9}{x-3}$	12. $f(x)=\frac{4}{x^3+8}$
v.a $x=2$	v.a $x=-3/2$	v.a none	v.a $x=-2$
hole: none	hole: none	hole: $(3,0)$	hole: none
h.a $y=4$	h.a $y=1$	h.a none	h.a $y=0$

$\frac{x(4x^2-3x+2)}{(x-2)(x^2+2x+4)}$ $f(x)=\frac{(2x-3)(2x-3)}{(2x+3)(2x+3)}$ $y=\frac{(\cancel{x-3})(x-3)}{\cancel{x-3}}$ $y=\frac{4}{(x+2)(x^2-2x+4)}$

CW

QUESTIONS:

1. Give 2 examples of functions that had no vertical asymptotes.

#1, 2, 3, 11 $f(x)=\frac{3x^2-1}{2x^2+1}$; $f(x)=\frac{3x}{x^2+1}$; $f(x)=\frac{x^2-4}{x+2}$ $f(x)=\frac{x^2-6x+9}{x-3}$

2. Why doesn't every function with a denominator have vertical asymptotes?

- after crossing out shared factors, no denominator factor may be left
- denominator may be unfactorable or have non real roots

3. In general, how do you find vertical asymptotes algebraically?

- factor top + bottom
- crossout shared factors
- set remaining denominators = 0 and solve

4. List all the functions that did not have horizontal asymptotes.

* #3 $f(x)=\frac{x^2-4}{x+2}$ #7 $f(x)=\frac{3x^4}{x^2-16}$ #11 $f(x)=\frac{x^2-6x+9}{x-3}$

5. What do the functions that have no horizontal asymptotes have in common?

* Degree of top is greater than degree of bottom

6. List all the functions that had horizontal asymptotes of y = 0.

* #2 $f(x)=\frac{3x}{x^2+1}$ #4 $f(x)=\frac{x+2}{x^2-4}$ #5 $f(x)=\frac{x}{x^2-9}$ #12 $f(x)=\frac{4}{x^3+8}$

7. What do functions that had horizontal asymptotes of y = 0 have in common?

* Degree of bottom is greater than degree of top

8. List all other functions with horizontal asymptotes that have not already been listed.

* #1 $f(x)=\frac{3x^2-1}{2x^2+1}$ #6 $f(x)=\frac{5x^2-9}{3x^2-3}$ #9 $f(x)=\frac{4x^3-3x^2+2x}{x^3-8}$ #10 $f(x)=\frac{4x^2-12x+9}{(2x+3)^2}$

9. What do all other functions with horizontal asymptotes that have not already been listed have in common?

* Degree of top and bottom is the same

10. Examine the equations of functions with and without horizontal asymptotes. What is a quick way to determine their horizontal asymptotes looking only at the equation, without the help of a graph or table?

Look at their degree

Summarize how to find the equation of a horizontal asymptote for any rational function. Looking at degree...

Bottom > Top
$y = 0$
Same $\rightarrow$ ratio of leading coefficients
Top > Bottom
NO

6

Name KEY

ICM Unit 6
Homework Day 3 p. 98 # 17,19, 55-61 odd, 63-66, 67, 70

In Exercises 17 and 19, find the **domain, range** and **end behavior**. Write the end behavior using limits.

17. $f(x)=10-x^2$

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

Range: $(-\infty, 10]$

End Behavior: $\lim\limits_{x\to\infty} f(x)=-\infty$ $\lim\limits_{x\to-\infty} f(x)=-\infty$

19. $f(x)=\dfrac{x^2}{1-x^2}$

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

Range: $(-\infty,-1)\cup[0,\infty)$

End Behavior: $\lim\limits_{x\to\infty} f(x)=-1$ $\lim\limits_{x\to-\infty} f(x)=-1$

In Exercises 55-61, find all **horizontal** and **vertical asymptotes** of the function.

B > T
y=0
Same - r(?)
Top > B
0
N not

55. $f(x)=\dfrac{x}{x-1}$ HA: $y=1$ VA: $x=1$

57. $g(x)=\dfrac{x+2}{3-x}$ HA: $y=-1$ VA: $x=3$

59. $f(x)=\dfrac{x^2+2}{x^2-1}$ HA: $y=1$ VA: $x=-1, 1$

61. $g(x)=\dfrac{4x-4}{x^3-8}$ HA: $y=0$ VA: $x=2$

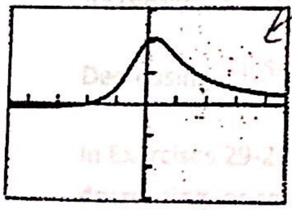
In Exercises 63-66, **match** the function with the corresponding **graph**.

63. $y=\dfrac{x+2}{2x+1}$ B

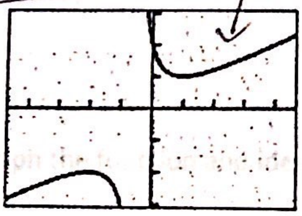
64. $y=\dfrac{x^2+2}{2x+1}$ C

65. $y=\dfrac{x+2}{2x^2+1}$ A

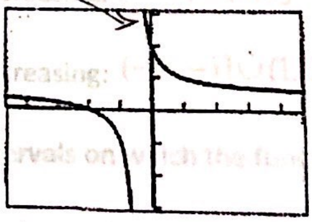
66. $y=\dfrac{x^3+2}{2x^2+1}$ D



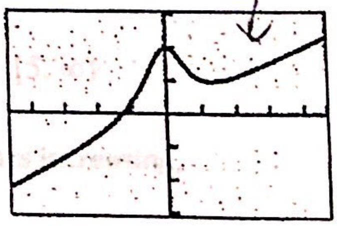
[–4.7, 4.7] by [–3.1, 3.1]
(a)



[–4.7, 4.7] by [–3.1, 3.1]
(c)



[–4.7, 4.7] by [–3.1, 3.1]
(b)



[–4.7, 4.7] by [–3.1, 3.1]
(d)

67. Can a graph cross its own asymptote? The Greek roots of the word "asymptote" mean "not meeting," since graphs tend to approach, but not meet, their asymptotes. Which of the following functions have graphs that *do* intersect their horizontal asymptotes?

(a) $f(x)=\dfrac{x}{x^2-1}$ (b) $g(x)=\dfrac{x}{x^2+1}$ (c) $h(x)=\dfrac{x^2}{x^3+1}$

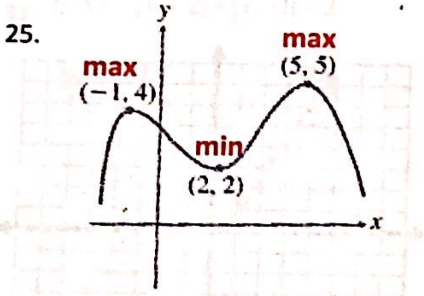
70. Explain why a graph cannot have more than 2 horizontal asymptotes.

ICM Unit 6
Homework Day 4 p. 98 #25-28 all, 29-33 odd, 41-45 odd

Name ______KEY__________

In Exercises 25-18, state whether each labeled point identifies a local **minimum**, a local **maximum**, or **neither** (write beside each point). Identify intervals on which the function is decreasing and increasing.

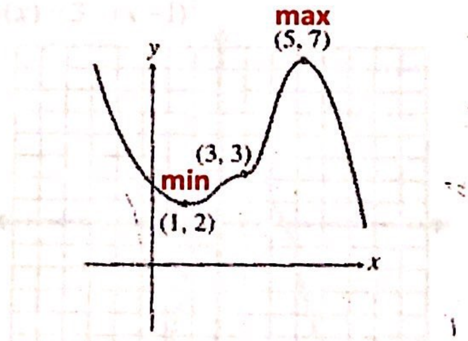
25.



Increasing: $(-\infty,-1]\cup[2,5]$

Decreasing: $[-1,2]\cup[5,\infty)$

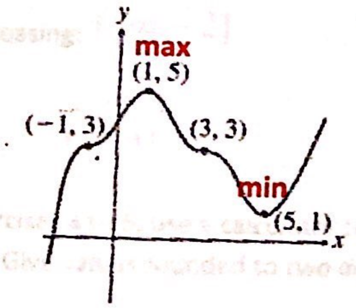
26.



Increasing: $[1,5]$

Decreasing: $(-\infty,1]\cup[5,\infty)$

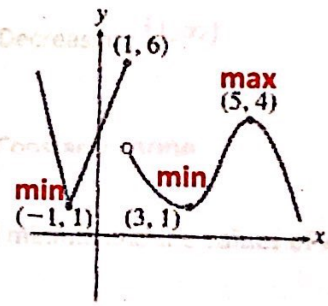
27.



Increasing: $(-\infty,1]\cup[5,\infty)$

Decreasing: $[1,5]$

28.

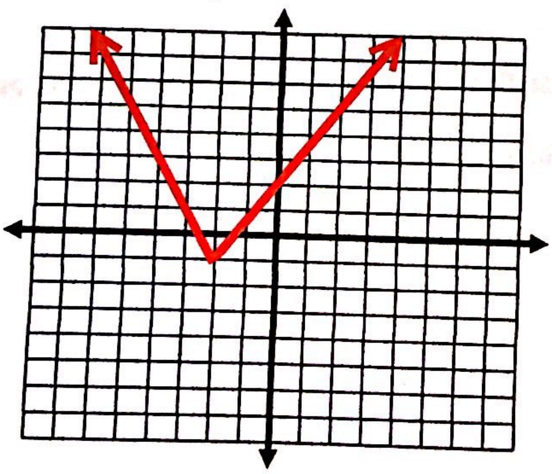


Increasing: $[-1,1]\cup[3,5]$

Decreasing: $(-\infty,-1]\cup(1,3]\cup[5,\infty)$

In Exercises 29-22, **graph** the function and **identify intervals** on which the function is **increasing**, **decreasing**, or **constant**.

29. $f(x)=|x+2|-1$



Increasing: $[-2,\infty)$

Decreasing: $(-\infty,-2]$

Constant: none

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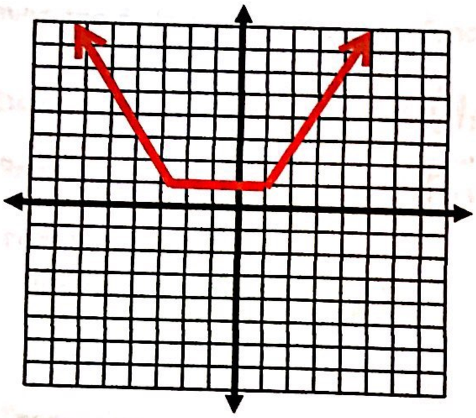
ICM Unit 6

Homework Day 4 p. 98 #25-28 all, 29-33 odd, 41-45 odd

Name ______KEY__________

31. $g(x)=|x+2|+|x-1|-2$

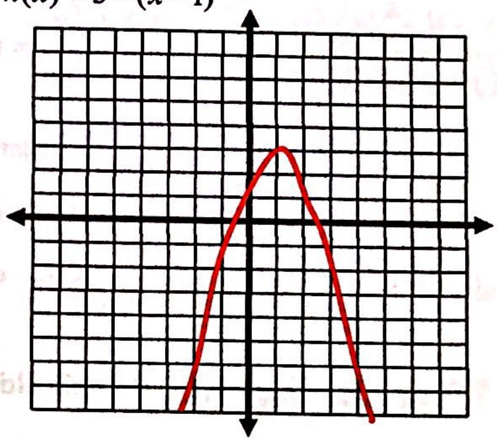


Increasing: $[1,\infty)$

Decreasing: $(-\infty,-2]$

$[-2,1]$

33. $h(x)=3-(x-1)^2$



Increasing: $(-\infty,1]$

Decreasing: $[1,\infty)$

Constant: none

In Exercises 41-45, use a calculator to find all **local maxima** and **minima** and the **values of x** where they occur. Give values rounded to *two decimal places*.

41. $f(x)=4-x+x^2$

Minima: 3.75 occurs at X = .5

Maxima: none

43. $g(x)=-x^3+2x-3$

Minima: -4.09 occurs at X = -.82

Maxima: -1.91 occurs at X = .82

45. $h(x)=x^2\sqrt{x+4}$

Minima: 0 occurs at x = 0 and 0 occurs at x = -4

Maxima: 9.16 occurs at -3.2

Homework: Quiz #2 Review

Determine the following for the given function (#1-20). $f(x)=\dfrac{x^3+64}{x^2-16}$ $\dfrac{(\cancel{x+4})(x^2-4x+16)}{(\cancel{x+4})(x-4)}$

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

2) Range: $(-\infty,-6)\cup(-6,-4]\cup[12,\infty)$

3) removable point of discontinuity: $(-4,-6)$

4) Increasing $(-\infty,-4)\cup(-4,0)\cup(8,\infty)$

5) Decreasing $(0,4)\cup(4,8)$

6) Local Min 12 at $x=8$

7) Local Max -4 at $x=0$

8) x-intercept(s): none

9) y-intercept(s): $(0,-4)$

10) vertical asymptotes: $x=4$

11) horizontal asymptotes none

12) Continuous? no, has a VA and hole

13) Nonremovable discontinuity? VA at $x=4$

14) $\lim\limits_{x\to\infty} f(x)=\infty$

15) $\lim\limits_{x\to-\infty} f(x)=-\infty$

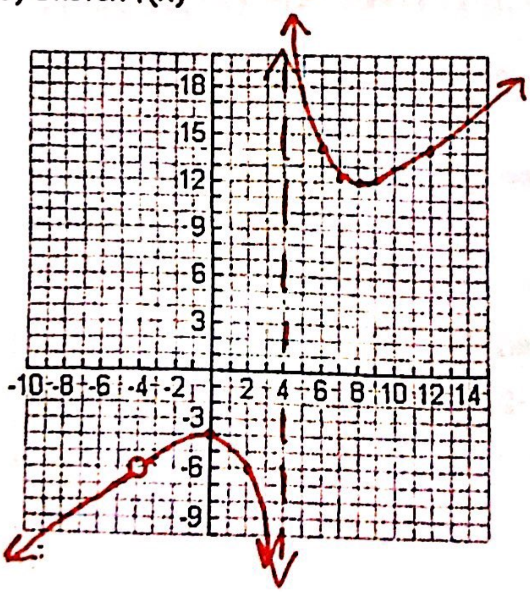
16) $\lim\limits_{x\to4^-} f(x)=-\infty$

17) $\lim\limits_{x\to4^+} f(x)=\infty$

18) $\lim\limits_{x\to4} f(x)$ DNE because limit is different at $x=4$ coming from left and right

19) $\lim\limits_{x\to-4} f(x)=-6$

20) Sketch f(x)



21) Given: $\sqrt{2x^2+11x+14}$ $\sqrt{(2x+7)(x+2)}$

Find Domain (no decimals): $(-\infty,-\frac{7}{2}]\cup[-2,\infty)$

Find Range: $[0,\infty)$

22) Given: $\dfrac{\sqrt{x+2}}{x-3}$

VA $= x=3$

Find Domain: $[-2,3)\cup(3,\infty)$ HA $= y=0$

Find Range: $(-\infty,\infty)$

Doesn't skip zero because of the x-int. at $(-2,0)$.

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In Exercises 47-53, state whether the function is odd, even, or neither. Support graphically (sketch) and confirm algebraically.

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

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

$f(-x)=f(x)$

$\therefore$ *Even*

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

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

$f(-x)=-f(x)$

$\therefore$ *Odd*

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

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

$f(-x)=f(x)$

$\therefore$ *Even*

50. $f(x)=\dfrac{3}{1+x^2}$

$f(-x)=\dfrac{3}{1+(-x)^2}=\dfrac{3}{1+x^2}$

$f(-x)=f(x)$

$\therefore$ *Even*

51. $f(x)=-x^2+0.03x+5$

$f(-x)=-(-x)^2+0.03(-x)+5\neq -x^2+0.03x+5$

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

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

$\therefore$ *Neither*

52. $f(x)=x^3+0.04x^2+3$

$f(-x)=(-x)^3+0.04(-x)^2+3\neq x^3+0.04x^2+3$

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

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

$\therefore$ *Neither*

53. $g(x)=2x^3-3x$

$f(-x)=2(-x)^3-3(-x)\neq -2x^3+3x$

$f(-x)=-f(x)$

$\therefore$ *odd*

72. True / False. A relation that is symmetric with respect to the x-axis cannot be a function. Justify your answer. TRUE

In Exercises 1-4, find formulas for the functions $f+g$, $f-g$, and fg. Give the domain of function and the domain of each combined function.

1. $f(x)=2x-1;\ g(x)=x^2$

	FORMULAS →	DOMAIN
F(x) Domain: $(-\infty,\infty)$	$f+g: 2x-1+x^2$	$(-\infty,\infty)$

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G(x) Domain: $(-\infty,\infty)$	$f-g: 2x-1-x^2$	$(-\infty,\infty)$
	$fg: (2x-1)(x^2)$	$(-\infty,\infty)$

2. $f(x)=(x-1)^2;\ g(x)=3-x$

	FORMULAS →	DOMAIN
F(x) Domain: $(-\infty,\infty)$	$f+g: (x-1)^2+3-x$	$(-\infty,\infty)$
G(x) Domain: $(-\infty,\infty)$	$f-g: (x-1)^2-3+x$	$(-\infty,\infty)$
	$fg: (x-1)^2(3-x)$	$(-\infty,\infty)$

3. $f(x)=\sqrt{x};\ g(x)=\sin x$

	FORMULAS →	DOMAIN
F(x) Domain: $[0,\infty)$	$f+g: \sqrt{x}+\sin x$	$[0,\infty)$
G(x) Domain: $(-\infty,\infty)$	$f-g: \sqrt{x}-\sin x$	$[0,\infty)$
	$fg: \sqrt{x}\sin x$	$[0,\infty)$

4. $f(x)=\sqrt{x+5};\ g(x)=|x+3|$

	FORMULAS →	DOMAIN
F(x) Domain: $[-5,\infty)$	$f+g: \sqrt{x+5}+|x+3|$	$[-5,\infty)$
G(x) Domain: $(-\infty,\infty)$	$f-g: \sqrt{x+5}-|x+3|$	$[-5,\infty)$
	$fg: \sqrt{x+5}\bullet|x+3|$	$[-5,\infty)$

In Exercises 5 and 6, find formulas for f/g and g/f. Give the domain of each functions and each combined function.

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5. $f(x)=\sqrt{x+3};\ g(x)=x^2$

	FORMULAS →	DOMAIN
F(x) Domain: $[-3,\infty)$	$f/g:\dfrac{\sqrt{x+3}}{x^2}$	$[-3,0)\cup(0,\infty)$
G(x) Domain: $(-\infty,\infty)$	$g/f:\dfrac{x^2}{\sqrt{x+3}}$	$(-3,\infty)$

6. $f(x)=\sqrt{x-2};\ g(x)=\sqrt{x+4}$

	FORMULAS →	DOMAIN
F(x) Domain: $[2,\infty)$	$f/g:\dfrac{\sqrt{x-2}}{\sqrt{x+4}}$	$[2,\infty)$
G(x) Domain: $[-4,\infty)$	$g/f:\dfrac{\sqrt{x+4}}{\sqrt{x-2}}$	$(2,\infty)$

In Exercises 9, find $(f\circ g)(3)\ and\ (g\circ f)(-2)$

9. $f(x)=2x-3;\ g(x)=x+1$

$(f\circ g)(3)=5\ and\ (g\circ f)(-2)=-6$

In Exercises 11-13, find $f(g(x))\ and\ g(f(x))$. State the domain of each.

11. $f(x)=3x+2;\ g(x)=x-1$

$f(g(x))=3x-1 and\ g(f(x))=3x+1$

Domain: All Real Numbers

13. $f(x)=x^2-2;\ g(x)=\sqrt{x+1}$

$f(g(x))=(\sqrt{x+1})^2-2 and\ g(f(x))=\sqrt{(x^2-2)+1}$

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

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In Exercises 15-19, find $f(x)$ *and* $g(x)$ so that the function can be described as $y=f(g(x))$.

15. $y=\sqrt{x^2-5x}$

Example: $f(x)=\sqrt{x}$ $g(x)=x^2-5x$

17. $y=|3x-2|$

Example: $f(x)=|x|$ $g(x)=3x-2$

19. $y=(x-3)^5+2$

Example: $f(x)=x^5+2$ $g(x)=x-3$