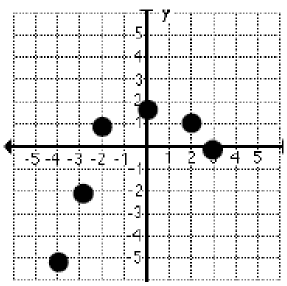
Name: ______________________________________ Period: _____ DUE DATE: Tues, Oct 15

UNIT 1: FUNCTIONS
PART 1
RETAKE PRACTICE PACKET

(#1) Determine whether the following relations are functions. Describe your reasoning.

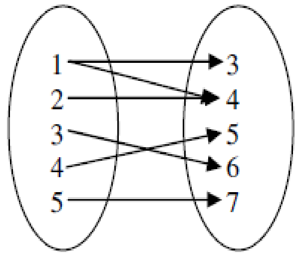
a) Function?



Yes no

Explain:

b) Function?



Yes no

Explain:

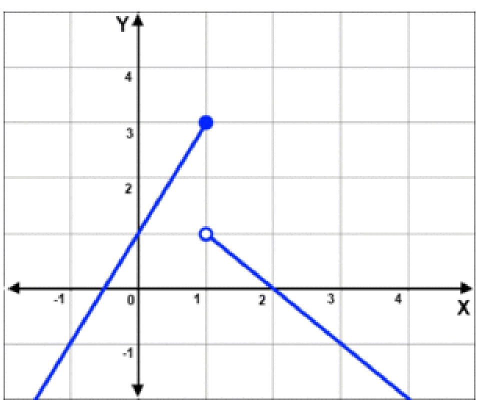
c) Function?

{(5, 2), (-3, -2), (3, 3), (-1, -1)}

Yes no

Explain:

(#2) Use the graph of $y = f(x)$ to answer each question below. SOME HAVE MORE THAN ONE ANSWER!



(a) $f(-1) =$ __

(b) $f(1) =$ ___

(c) $f(0) + f(3) =$ ___

(d) $f(\_\_\_) = 3$

(e) Find x such that $f(x) = -1$

(#3) Use the table and equation below to answer the following questions. SOME HAVE MORE THAN ONE ANSWER!

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

x	$f(x)$
0	1
2	5
4	-1
8	12
10	1

(a) $f(\_\_\_\_) = 1$

(b) $g(3) =$ ____

(c) $f(8) = g(\_\_\_\_\_\_)$

(d) $g(x) = 0$

$x =$ _____

(e) $g\left(\frac{1}{2}\right) =$ _____

(#4) Represent the square root parent function as an equation and sketch of a graph below.	

5. If $f(x) = 3x - 5$ and $g(x) = x^2$, find $\left(f(g(3)\right)$

6. If $f(x) = -9x - 9$ and $g(x) = \sqrt{x-9}$, find $\left(f(g(10)\right)$

7. If $f(x) = -4x + 2$ and $g(x) = \sqrt{x-8}$, find $\left(f \circ g\right)(12)$

8. If $f(x) = -3x + 4$ and $g(x)$ is the quadratic parent function, find $\left(g \circ f\right)(-2)$

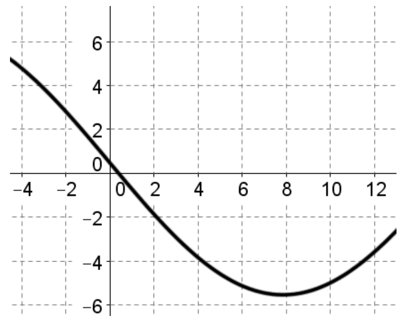
Use the functions below to answer question 9-16.

$f(x)=\frac{1}{2}x^2-12$

$m(x) = -3x - 8$

$n(x) = \{(-2,5), (-1,0), (0,-3), (1,-4)\}$

The graph below is g(x)



x	h(x)
2	15
3	-12
4	5
5	2
6	3

9. $3f(4) + f(10)$ ______

10. $2h(3) - g(2)$ ______

11. $f(0) - m(1)$ ______

12. f(4)=g(___) ______

13. $g(8) \bullet h(4)$ ______

14. $f(8) \div h(5)$ ______

15. $f(4) \cdot n(1) \cdot h(4)$ ______

16. g(-2)=h(___) ______

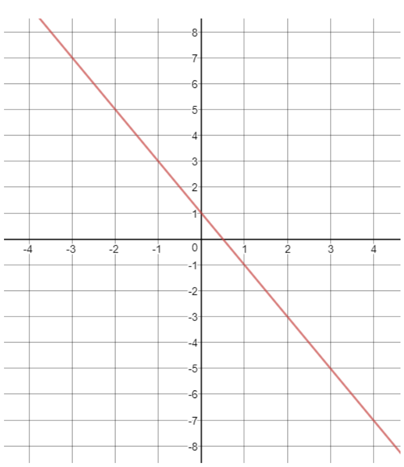
17. $m\left(\frac{2}{3}\right) \cdot h(2) =$ ______

18. $(g + f)(2) =$ ______

19. $h(6) + n(x) = -1$ $x=$ ______

20. $m(-2) + g(x) = -7$ $x=$ ______

21. Given $f(x)$ graphed below and $g(x)=\sqrt{x^2-5}$, find $(g(f(2))$



22. Suppose $f(x) = 3x - 9$. Fill in the blank. $f(\_\_\_\_\_\_) = -10$

23. Given $p(x) = \begin{cases} -2x - 3, & x \le 0 \\ -x^2 - 4, & x > 0 \end{cases}$

Find P(-9)=

24. Given $h(x) = \begin{cases} \frac{1}{2}x - 5, & x < 0 \\ \frac{1}{5}x - 2, & x \ge 0 \end{cases}$

Find h(30)-h(-30)=

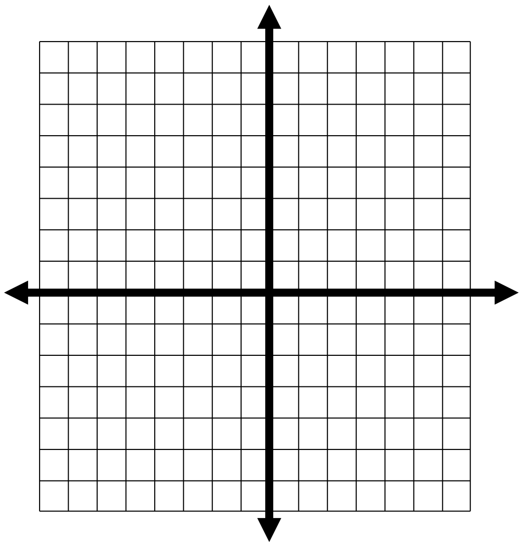
$$g(x) = \begin{cases} x^2 - 3x \text{ for } x < 0 \\ 12 \quad \text{for } x \ge 0 \end{cases}$$

25. Given

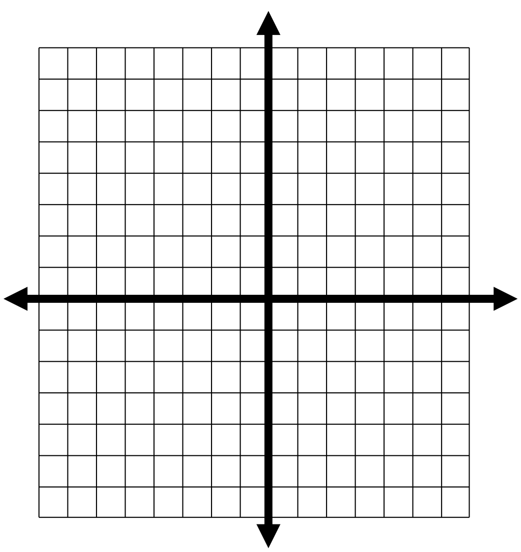
Find g(-2)+g(2)=

Graph each piecewise function by hand.

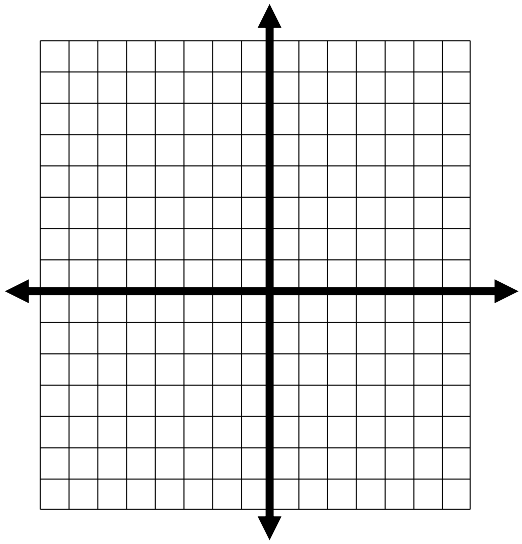
(#26) $f(x)=\begin{cases}2\sqrt{x-1} & x\geq 1\\ x^2+3 & x<1\end{cases}$



(#27) $f(x)=\begin{cases}x^2-1 & x\leq 0\\ 3 & 0<x\leq 5\\ (x\text{-}5)^3+2 & x>5\end{cases}$

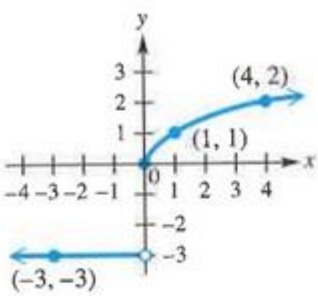


(#28) $f(x)=\begin{cases} |x+1| & x\le 0 \\ -\frac{1}{2}x+1 & 0<x\le 3 \\ -\sqrt{x-3} & x>3 \end{cases}$



Write an equation for each piecewise function graph below. Also, determine the key features of each function.

29)



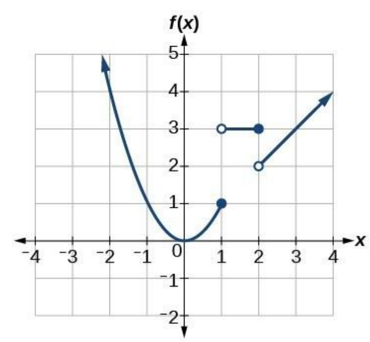
Equation:

Domain:

Range:

Increasing Intervals:

30)



Equation:

Domain:

Range:

End Behavior:

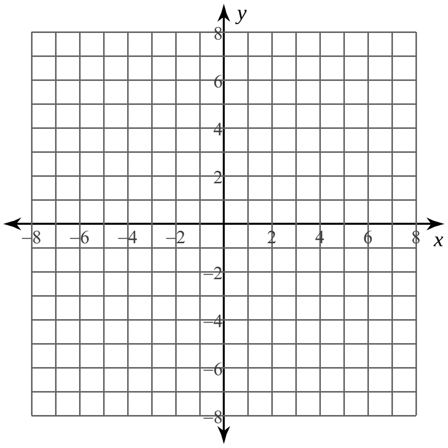
Name________________________________

Graphs of Polynomial Functions

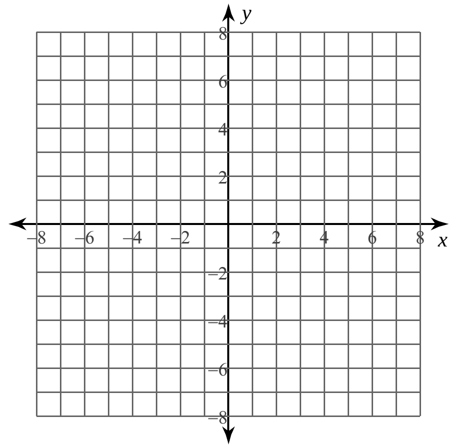
Date________________ Period____

For each function: (1) determine the real zeros and state the multiplicity of any repeated zeros, (2) list the x-intercepts where the graph crosses the x-axis and those where it does not cross the x-axis, and (3) sketch the graph.

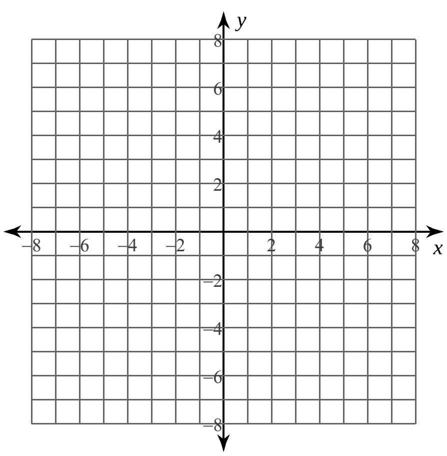
1) $f(x) = -x^3$



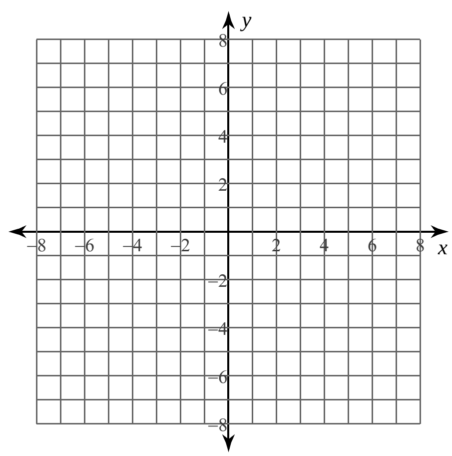
2) $f(x) = 2x^3 - 3x^2$



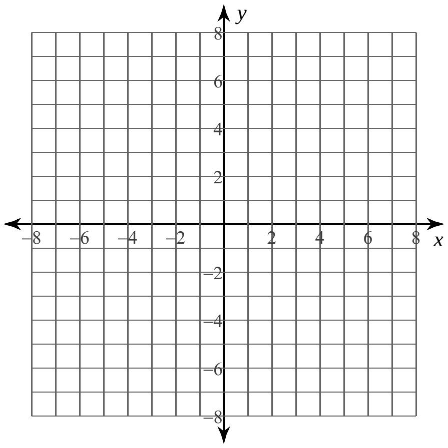
3) $f(x) = x^4 + x^3 - 4x^2 - 4x$



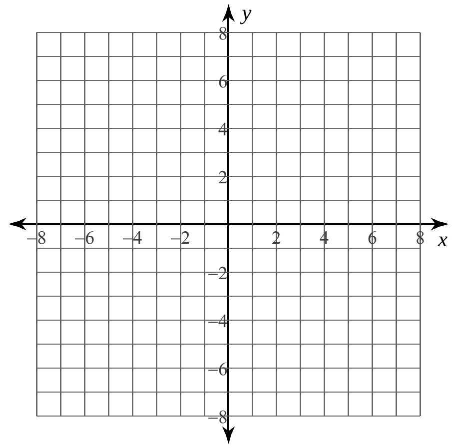
4) $f(x) = x^4 + x^3$



5) $f(x) = -x^3 + 6x^2 - 12x + 8$



6) $f(x) = x^3 - 2x^2$



Describe the end behavior of each function.

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

8) $f(x) = 2x^2 - 4x - 3$

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

10) $f(x) = -x^3 - 9x^2 - 24x - 20$

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

12) $f(x) = x^2 + 6x + 6$

Critical thinking questions:

13) Write a polynomial function f with the following properties:
(a) Zeros at 1, 2, and 3
(b) $f(x) \leq 0$ for all values of x
(c) Degree greater than 1

14) Write a polynomial function g with degree greater than one that passes through the points $(0, 1)$, $(1, 1)$, and $(2, 1)$.

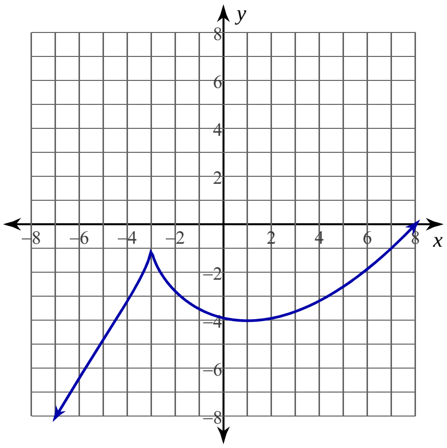
Name___________________________________

Extrema, Increase and Decrease

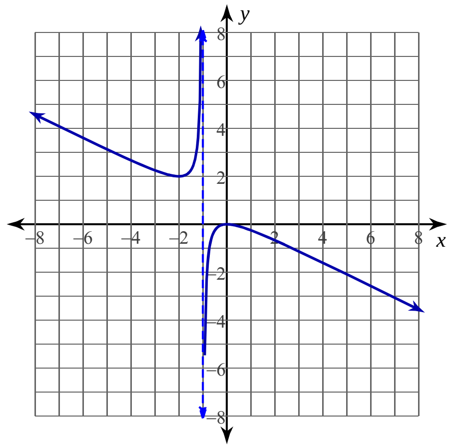
Date_________________ Period____

Approximate the relative extrema of each function.

1)



2)



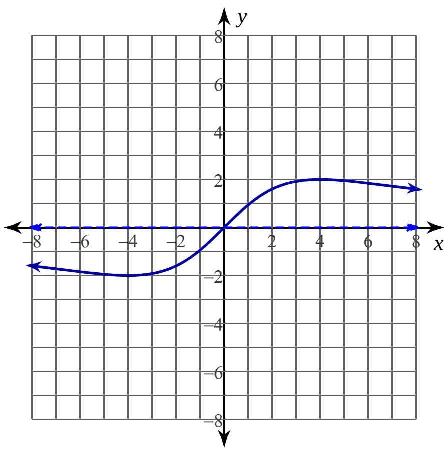
Use a graphing calculator to approximate the relative extrema of each function.

3) $y = -x^3 + 4x^2 - 4$

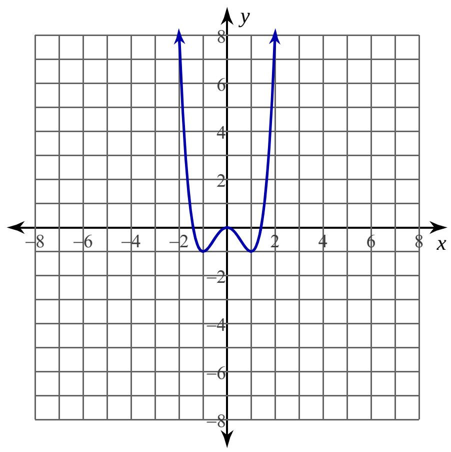
4) $y = \dfrac{x^2}{4x + 4}$

Approximate the intervals where each function is increasing and decreasing.

5)



6)



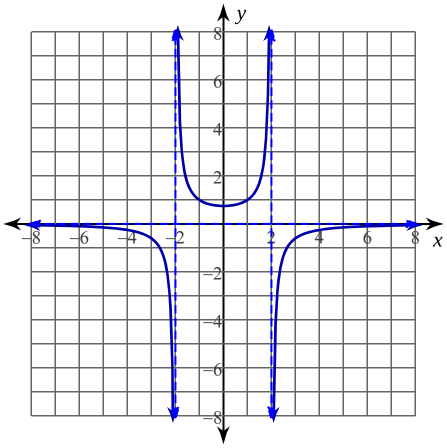
Use a graphing calculator to approximate the intervals where each function is increasing and decreasing.

7) $y = x^4 - 2x^2 - 3$

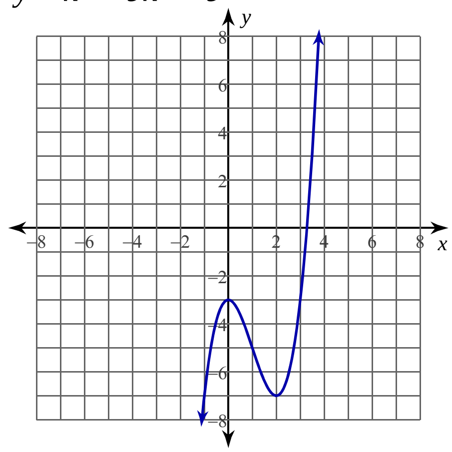
8) $y = -\dfrac{2}{x^2 - 1}$

Approximate the relative and absolute extrema of each function. Then approximate the intervals where each function is increasing and decreasing.

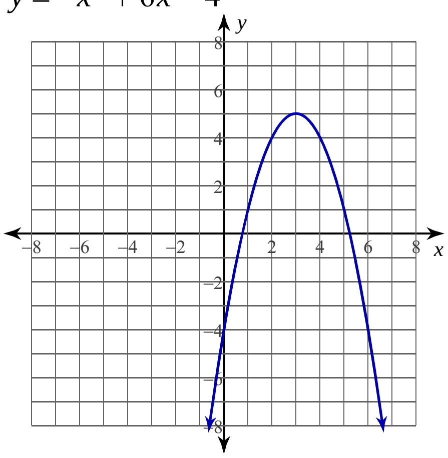
9) $y = -\frac{3}{x^2 - 4}$



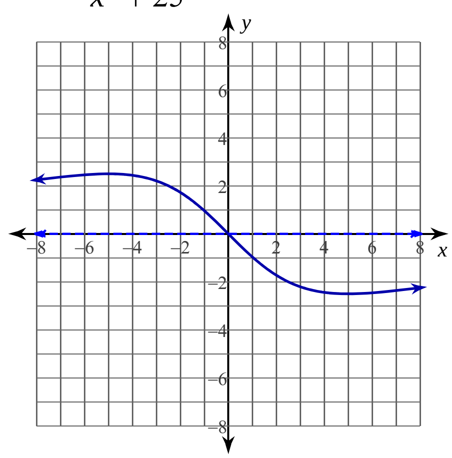
10) $y = x^3 - 3x^2 - 3$



11) $y = -x^2 + 6x - 4$



12) $y = -\frac{25x}{x^2 + 25}$



Critical thinking questions:

13) Write a function that has the following relative maximums: $(1, 1)$, $(2, 2)$, $(3, 3)$.

14) Is it possible for a continuous function to have only the following extrema?
Relative max: $(1, 1)$, $(3, 3)$
Relative min: $(2, 2)$
Explain why or why not.