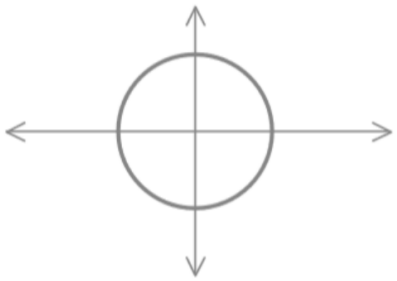
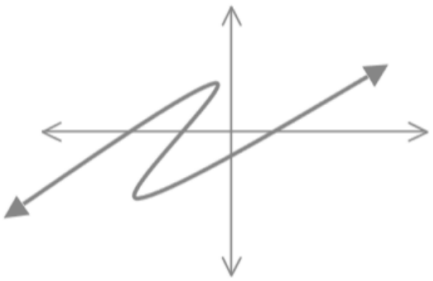
PreCalculus Review Lesson 3

Determine if each relation is a function. Explain.

1. $x^2 + y^2 = 5$	2. $y + 1 = 4\sqrt{x-2}$
3. $y - 2 = 10\,(x - 3)$	4. $x - 3 = y^2 + 8$
5. 	6. 

Finding the Domain of a Function Defined by an Equation

←from Notes 2-1a

1. Start with the domain as the set of all real numbers.
2. If the equation has a denominator, exclude any numbers that give a zero denominator.
3. If the equation has a radical of even index, exclude any numbers that cause the expression inside the radical (the radicand) to be negative.

Find the domain and write it in interval notation.

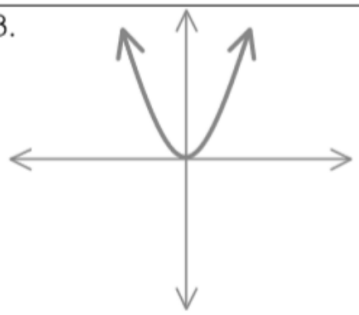
7. $f(x)=3x^2+7$	8. $f(x)=\frac{5}{2x+1}$
9. $f(x)=\frac{x}{-4x-7}$	10. $f(x)=\sqrt{x-6}$
11. $f(x)=\sqrt{-3x+1}$	12. $f(x)=\frac{10x^2}{\sqrt{-x+5}}$

Even function:
A function f is even if $f(-x) = f(x)$
graph is symmetric with respect to the y-axis

Odd function:
A function f is odd if $f(-x) = -f(x)$.
graph is symmetric with respect to the origin

Determine if the function is even, odd, or neither. Explain.

13.



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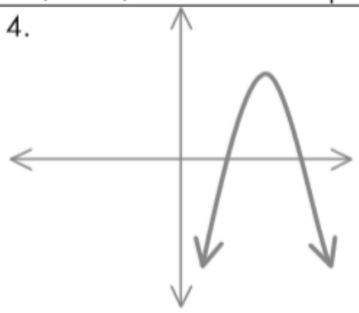

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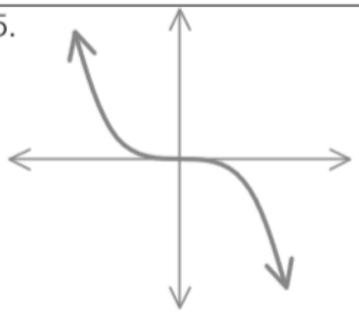


EXAMPLES Determine *algebraically* whether a function is even.

Step 1: Replace every x with –x and simplify;
Step 2: If the result is equal to the original $f(x)$, then the function is EVEN, so $f(x) = f(-x)$

EXAMPLES Determine *algebraically* whether a function is odd .

Step 1: Replace every x with –x and y with -y. Simplify and solve for y.
Step 2: If the result is equal to the original $f(x)$, then the function is ODD, so $f(-x) = -f(x)$

Determine algebraically if the function is even, odd, or neither.

16. $f(x) = -8x^2$	17. $f(x) = x^3 + 4$
18. $f(x) = 5x^4 + x^2 + 3$	19. $f(x) = -2x^3 - 5x^2$
20. $f(x) = -x^4 + 2x - 1$	21. $f(x) = 4x^3 + 7x$

Intercepts:

*y-intercept: the value of $f(x)$ at $x = 0$, written as an ordered pair, $(0, y)$.
The *y*-intercept is where the function crosses the *y*-axis.

*x-intercept: solution(s) of the equation. Written as ordered pairs, $(x, 0)$.
*zeros of *f*
*roots of *f*

Find all the intercepts.

22. $f(x) = 2x^2 - 26x - 60$	23. $f(x) = 2x^3 - 11x^2 - 21x$

Increasing & Decreasing Functions

f* is **increasing on an interval when the slope is positive.

f* is **decreasing on an open interval when slope is negative.

f* is **constant on an open interval when the slope is 0.

Increasing/Decreasing Steps

Step 1: Vertical lines through turning points

Step 2: Label sections as INC or DEC.

Step 3: Label the x-axis with $-\infty$ and ∞

Step 4: Read the x-axis for each section.

Local Maximum; Local Minimum

A function *f* has a **local maximum at c** if there is an open interval *I* containing c so that, for all $x \neq c$ in *I*, $f(x) < f(c)$. *A function *f* has a **local maximum** at a peak.

A function *f* has a **local minimum at c** if there is an open interval *I* containing c so that, for all $x \neq c$ in *I*, $f(x) > f(c)$. *A function *f* has a **local minimum** at a valley.

Answer the questions about the graph. Use interval notation.

24.

Domain: _____

Range: _____

Increasing: _____

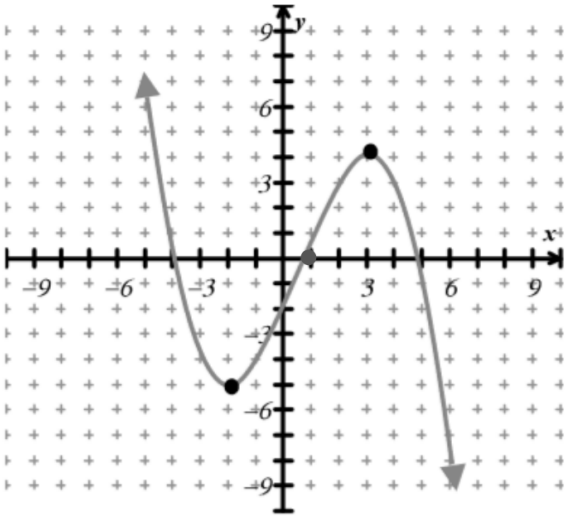
Decreasing: _____

Local Maxima: _____

Local Minimum: _____

f(x) < 0: _____

f(x) ≥ 0: _____



ALL Intercepts: _____

In how many places will y = 4 intercept the graph?

25.

Domain: _____

Range: _____

Increasing: _____

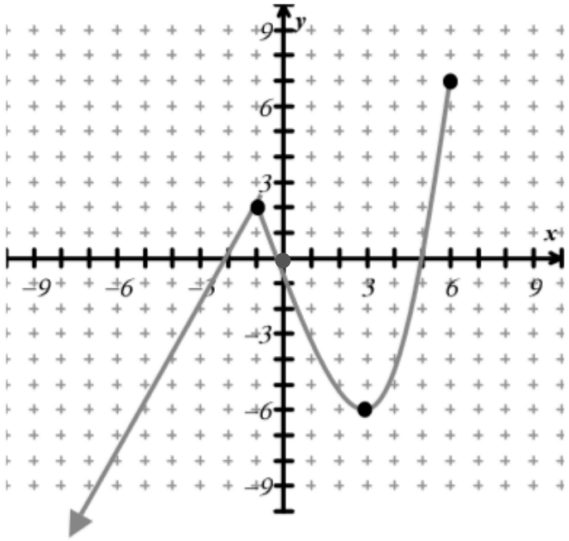
Decreasing: _____

Local Maximum: _____

Local Minima: _____

f(x) < 0: _____

f(x) ≥ 0: _____



ALL Intercepts: _____

In how many places will $y = -\frac{1}{3}$ intercept the graph?