**Honors Precalculus**
**Summer Quiz Review**

Name: ____________________
Date: ______________ Block: _____

### Bounded Intervals

Let $a$ and $b$ be real numbers with $a < b$. The numbers $a$ and $b$ are the endpoints of each interval.

| Interval Notation | Interval Type | Inequality Notation | Graph |
|---|---|---|---|
| $[a, b]$ | closed | $a \le x \le b$ | a b |
| $(a, b)$ | open | $a < x < b$ | a b |
| $[a, b)$ | half open<br>closed-open | $a \le x < b$ | a b |
| $(a, b]$ | half open<br>open-closed | $a < x \le b$ | a b |

### Unbounded Intervals

Let $a$ and $b$ be real numbers. Each of these intervals has exactly one endpoint, $a$ or $b$.

| Interval Notation | Interval Type | Inequality Notation | Graph |
|---|---|---|---|
| $[a, \infty)$ | closed | $x \ge a$ | a |
| $(a, \infty)$ | open | $x > a$ | a |
| $(-\infty, b]$ | closed | $x \le b$ | b |
| $(-\infty, b)$ | open | $x < b$ | b |

### Using Interval Notation

**Write each interval as an inequality.**

1.) $[-3, 9)$ $-3 \le x < 9$

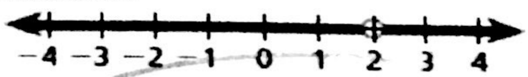
2.) $[-3, \infty)$ $-3 \le x$

3.) $(-\infty, 4) \cup [5, \infty)$ $x < 4$ ~~and~~ ~~&~~ or $x \ge 5$

**Given the graph of the inequality, write the domain in interval notation.**

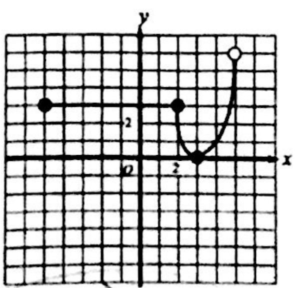
4.) 

$(-3, 5]$

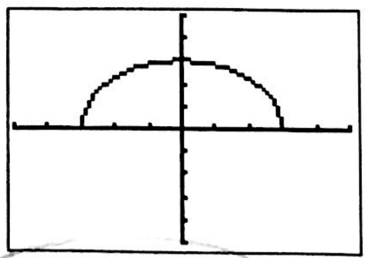
5.) 

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

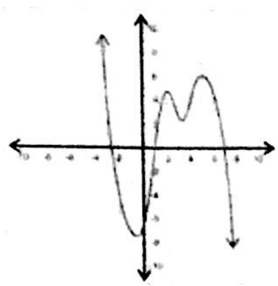
**Given each graph, write the domain in interval notation.**

6.) 

$[-5, 5)$

7.) 

$[-3, 3]$

8.) 

$(-\infty, \infty)$

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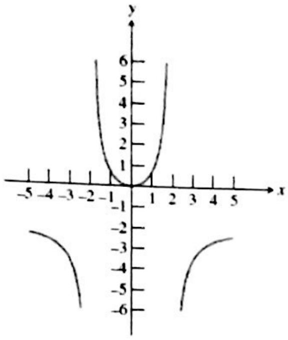
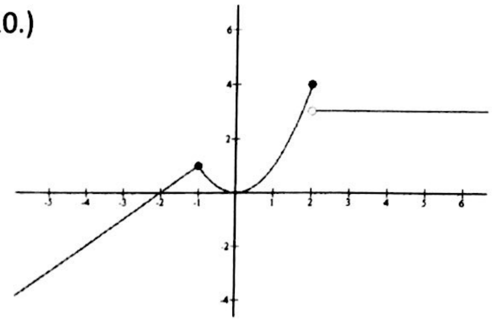
**Domain:** **Find the domain of each function.**

9.)




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

10.)



$(-\infty, \infty)$

11.) $f(x) = \frac{\sqrt{x}}{x-5}$

$x \geq 0$

$x \neq 5$

$[0, 5) \cup (5, \infty)$

12.) $f(x) = \frac{\sqrt{4-x}}{(x+1)(x^2+1)}$

$x \neq -1$

$4 - x \geq 0$

$4 \geq x$

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

**Increasing & Decreasing Intervals:** **Identify intervals where the function is increasing or decreasing.**

13.) $f(x) = (x+2)^2$

I : $(-2, \infty)$

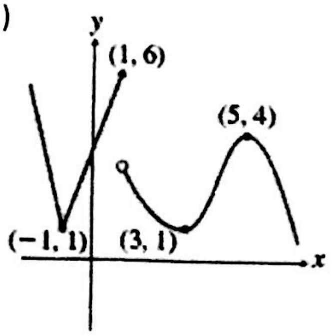
D : $(-\infty, -2)$

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

I: $(-\infty, -1)$ , $(-1, 0)$

D: $(0, 1)$ , $(1, \infty)$

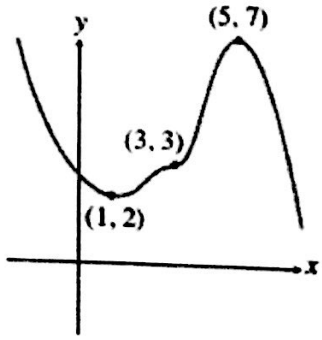
15.)




I : $(-1, 1)$ , $(3, 5)$

D : $(-\infty, -1)$, $(1, 3)$, $(5, \infty)$

16.)




I : $(1, 5)$

D : $(-\infty, 1)$ , $(5, \infty)$

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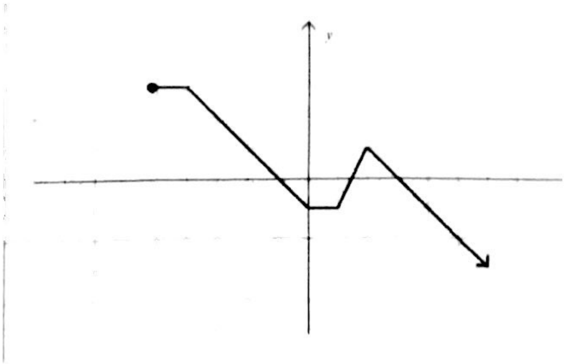
a.) State the domain of the function in interval notation.

$[-5, \infty)$

b.) State the range of the function in interval notation.

$(-\infty, 3]$



c.) Find $f(-3)$.

$2$

d.) Find the intervals on which the function is decreasing.

$(-4, 0)$ $(2, \infty)$

e.) Find the intervals on which the function is increasing.

$(1, 2)$

f.) Find the intervals on which the function is constant.

$(-5, -4)$ $(0, 1)$

**Find the domain of each function algebraically. Show your work.**

18.) $h(x) = \sqrt{3-x}$

$3 - x \geq 0$

$3 \geq x$

$x \leq 3$

$(-\infty, 3]$

19.) $p(x) = \sqrt{x^2 - 5x}$ $\sqrt{x(x-5)}$

✓ ✗ ✓

0 5

$(-\infty, 0] \cup [5, \infty)$

20.) $r(x) = \dfrac{1}{x^2 - 4x - 12}$ $x = 6, -2$

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

$(-\infty, -2) \cup (-2, 6) \cup (6, \infty)$

21.) $k(x) = x^3$

$(-\infty, \infty)$

**Prove algebraically that the function is even, odd, or neither.**

22.) $p(x) = -3x^2 + 4$

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

$p(-x) = p(x)$

even

23.) $p(x) = 2x^3 - 3x^2 - 4x + 4$

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

$p(-x) \neq p(x)$

$p(-x) \neq -p(x)$

neither

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**Prove algebraically that the function is even, odd, or neither.**

24.) $h(x) = |x| + 4$

$h(-x) = |x| + 4$

$h(-x) = h(x)$

even

25.) $t(x) = 2x^3 - 4x$

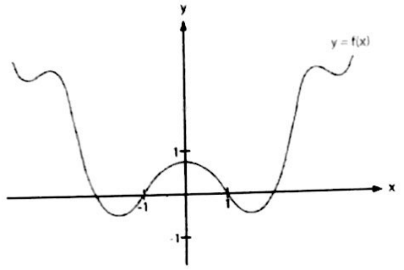
$t(-x) = -2x^3 + 4x$

$t(-x) = -t(x)$

odd

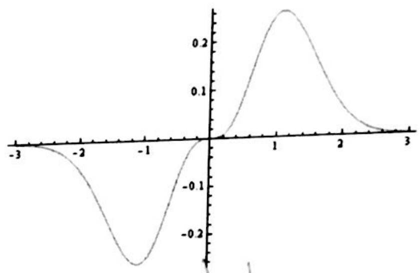
**Determine whether the graph represents a function that is even, odd, or neither.**

26.)




even

27.)




odd

**Find all asymptotes.**

28.) $f(x) = \dfrac{5x^2}{x^2 - 1}$

$x = 1$ $y = 5$

$x = -1$

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

$y = 0$

$x = 2$

$x = 1$

**Use the twelve basic functions to answer the questions.**

30.) Domain

- Nine of the functions have domain the set of all real numbers. Which three do not?

  Rational Function, Logarithm, square root

  *(Reciprocal)

- One of the functions has domain the set of all reals except 0. Which function is it, and why isn't zero in its domain? reciprocal*

  rational Function

  When $x = 0$, denominator $= 0$.

- Which two functions have no negative numbers in their domains? Of these two, which one is defined at zero?

  Square root, logarithm

  square root is defined at 0.

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31.) Continuity

- Only two of the twelve functions have points of discontinuity. Are these points in the domain of the function?

reciprocal
rational Function ; no → continuous in domain

greatest integer function ; yes. → discontinuous in domain

32.) Boundedness → explain, not in video.

- Only three of the twelve basic functions are bounded (above and below). Which three?

cosine, sine, logistic

33.) Symmetry

- Three of the twelve basic functions are even. Which are they?

cosine, quadratic (squaring), absolute value.

34.) Piecewise Function

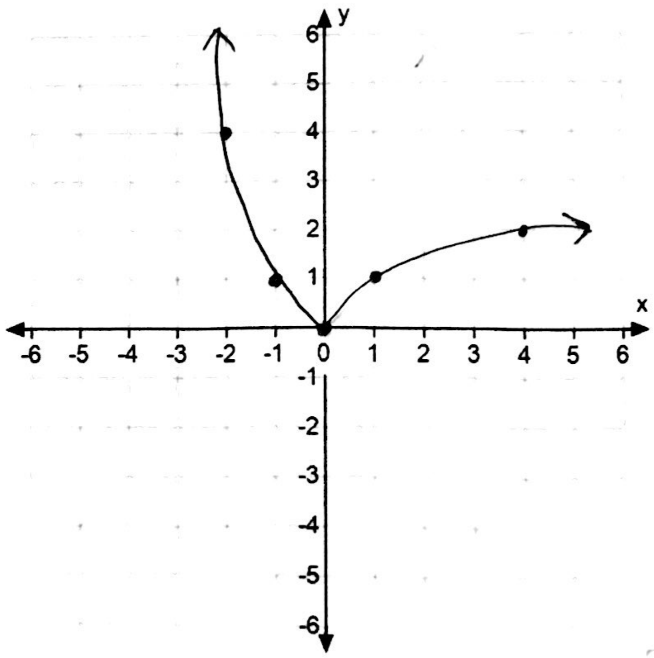
- Which of the twelve basic functions has the following piecewise definition over separate intervals of its domain?

$$f(x) = \begin{cases} x & if\ x \geq 0 \\ -x & if\ x < 0 \end{cases}$$

absolute value.

- Sketch the following function:

$$f(x) = \begin{cases} x^2\ if\ x \leq 0 \\ \sqrt{x}\ if\ x > 0 \end{cases}$$

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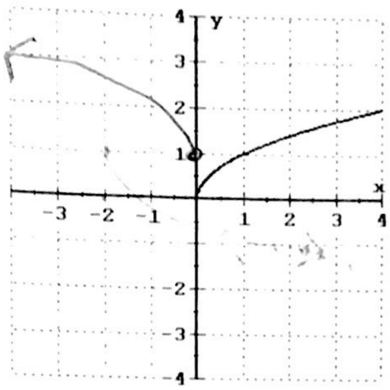
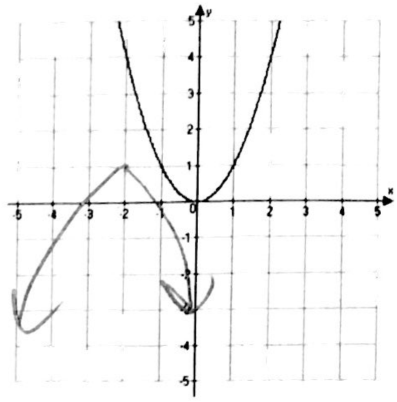
35.) Without using a calculator, sketch the graph of the new functions.

a.) Given: $f(x)=\sqrt{x}$ Graph: $f(x)=\sqrt{-x}+1$

b.) Given: $f(x)=x^2$ Graph:

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





36.) Write the equation for $g(x)=x^3$, which is changed by the following transformations:

a.) Horizontal translation to the right 3 units
b.) Vertical stretch by a factor of 2
c.) Reflection in the x-axis
d.) Vertical translation downward 1 unit

$g(x) =$ $-2(x-3)^3-1$

37.) Answer the three parts of the question.

Part 1: Identify the common function *f*.
Part 2: Use function notation to write *h* in terms of *f*.
Part 3: Describe the transformation from *f* to *h*.

a.) $h(x)=-(x+10)^3+5$

$f(x)=x^3$

$h(x)=-f(x+10)+5$

Rx, Left 10, up 5

b.) $h(x)=|4-x|+7$

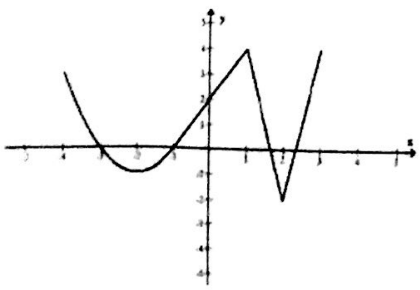
$f(x)=|x|$

$h(x)=f(-x+4)+7$

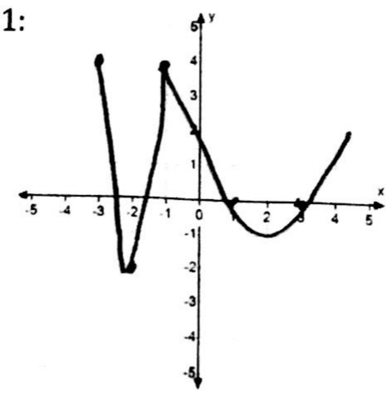
Ry, Right 4, up 7

38.) Given $f(x)$, graph $f(-x)-2$ in two steps.

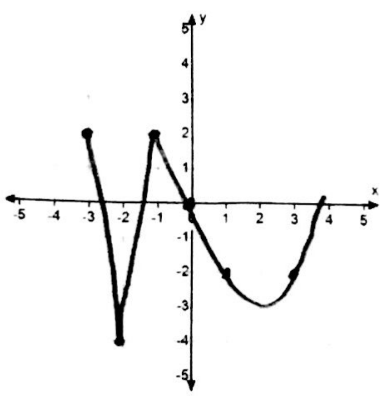
Given:



Step 1:



Step 2:



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