Name Key Date Class

LESSON 1-1

Domain, Range, and End Behavior

Practice and Problem Solving: A/B

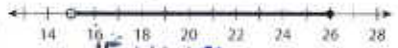
Describe the interval shown using an inequality, set notation, and interval notation.

1. 

Inequality: $x \geq -3$

Set Notation: $\{x \mid x > -3\}$

Interval Notation: $(-3, \infty)$

2. 

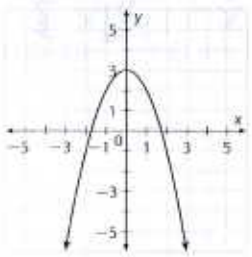
Inequality: $15 < x \leq 26$

Set Notation: $\{x \mid 15 < x \leq 26\}$

Interval Notation: $(15, 26]$

Describe the domain and range of the graph using an inequality, set notation, and interval notation. Then describe its end behavior.

3. Graph of $f(x) = -x^2 + 3$:



Domain:

Inequality: $x \in \mathbb{R}$

Set Notation: $\{x \in \mathbb{R}\}$

Interval Notation: $(-\infty, \infty)$

Range:

Inequality: $y \leq 3$

Set Notation: $\{y \mid y \leq 3\}$

Interval Notation: $(-\infty, 3]$

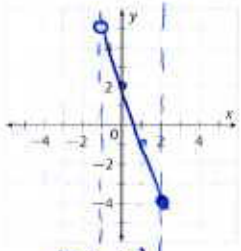
End Behavior:

As $x \to -\infty$, $f(x) \to -\infty$

As $x \to +\infty$, $f(x) \to -\infty$

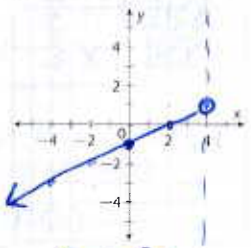
Draw the graph of the function with its given domain. Then determine the range using interval notation.

4. $g(x) = -3x + 2$ with domain $(-1, 2]$:



Range: $(-4, 5)$

5. $h(x) = 0.5x - 1$ with domain $(-\infty, 4)$:



Range: $(-\infty, 1)$

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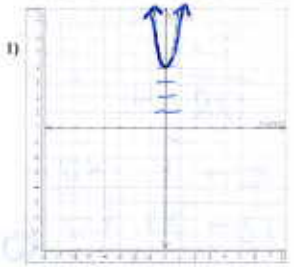
Select the domain and the range of the function as an inequality, using set notation, and using interval notation. Then describe the end behavior of the function.

1) The graph of the quadratic function $f(x) = 6x^2 + 4$ is shown.



Domain:

Inequality: $x \in \mathbb{R}$

Set notation: $\{x \in \mathbb{R}\}$

Interval notation: $(-\infty, \infty)$

Range:

Inequality: $y \geq 4$

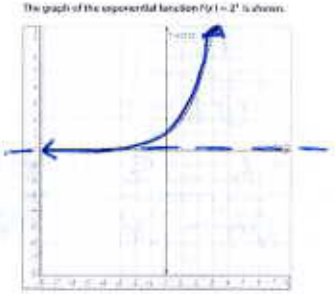
Set notation: $\{y \mid y \geq 4\}$

Interval notation: $[4, \infty)$

End behavior: As $x \to -\infty$ $f(x) \to +\infty$

As $x \to +\infty$ $f(x) \to +\infty$

2) The graph of the exponential function $f(x) = 2^x$ is shown.



Domain:

Inequality: $x \in \mathbb{R}$

Set notation: $\{x \in \mathbb{R}\}$

Interval notation: $(-\infty, \infty)$

Range:

Inequality: $y > 0$

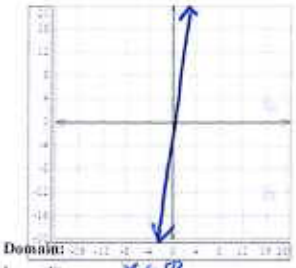
Set notation: $\{y \mid y > 0\}$

Interval notation: $(0, \infty)$

End behavior: As $x \to -\infty$ $f(x) \to 0$

As $x \to +\infty$ $f(x) \to \infty$

3) The graph of the linear function $f(x) = 8x - 2$ is shown.



Domain:

Inequality: $x \in \mathbb{R}$

Set notation: $\{x \in \mathbb{R}\}$

Interval notation: $(-\infty, \infty)$

Range:

Inequality: $y \in \mathbb{R}$

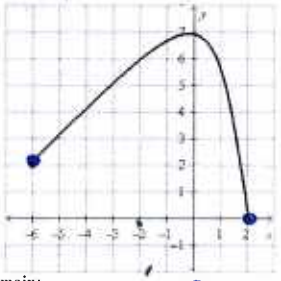
Set notation: $\{y \in \mathbb{R}\}$

Interval notation: $(-\infty, \infty)$

End behavior: As $x \to -\infty$ $f(x) \to -\infty$

As $x \to +\infty$ $f(x) \to +\infty$

4)



Domain:

Inequality: $-6 \leq x \leq 2$

Set notation: $\{x \mid -6 \leq x \leq 2\}$

Interval notation: $[-6, 2]$

Range:

Inequality: $0 \leq y \leq 7$

Set notation: $\{y \mid 0 \leq y \leq 7\}$

Interval notation: $[0, 7]$

End behavior: As $x \to -\infty$ $f(x) \to -6$

As $x \to +\infty$ $f(x) \to 0$

Bounded so no end behavior

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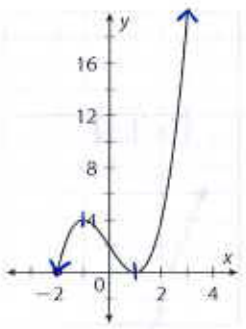
LESSON 1-2

Characteristics of Function Graphs

Practice and Problem Solving: A/B

Use the graph to answer Problems 6–9.



6. On which intervals is the function increasing and decreasing?

Inc: $\{x \mid -2 \le x \le -1\}$ & $\{x \mid x \ge 1\}$

dec: $\{y \mid -1 \le y \le 1\}$

7. What are the local maximum and minimum values?

Max: (−1, 4)

Min: (1, 0)

8. What are the zeros of the function?

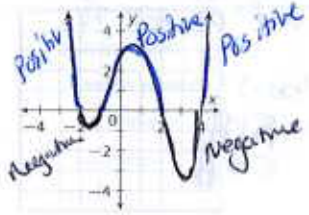
Zero's are $x = -2$ & $x = 1$

9. What is the domain and range?

Domain: $\{x \in \mathbb{R}\}$

Range: $\{y \in \mathbb{R}\}$

Use the graph for Problems 10–12. The first one is done for you.



10. On which intervals is the function positive?

$\{x \mid x < -2\}$, $\{x \mid -1 \le x < 2\}$, $\{x \mid x \ge 4\}$

11. On which intervals is the function negative?

$\{x \mid -2 \le x < -1\}$ and $\{x \mid 2 \le x \le 4\}$

12. What are the zeros of the function?

Zeros are $x = -2$, $x = -1$, $x = 2$ and $x = 4$

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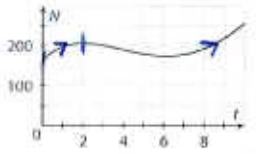
13. The graph shows a function that models the number N of seniors from a high school accepted at a four-year university as a function of time t in years over a ten-year period.



Is the function increasing on each of the following intervals?

A	$\{t \mid 0 < t < 2\}$	● Yes	○ No
B	$\{t \mid 2 < t < 6\}$	○ Yes	● No
C	$\{t \mid 6 < t < 10\}$	● Yes	○ No

14. The table shows some values of a polynomial function.

x	0	1	2	3	4
$g(x)$	80	100	60	20	40

Is the average rate of change of the function positive over each of the following intervals?

A	From $x = 0$ to $x = 1$	● Yes	○ No
B	From $x = 1$ to $x = 2$	○ Yes	● No
C	From $x = 1$ to $x = 3$	○ Yes	● No
D	From $x = 3$ to $x = 4$	● Yes	○ No

A) $\frac{\Delta y}{\Delta x} = \frac{80 - 100}{0 - 1}$

$= \frac{-20}{-1}$

$= 20$ ✓ Positive

B) $\frac{100 - 60}{1 - 2}$

$= \frac{40}{-1}$

$= -40$ negative

C) $\frac{\Delta y}{\Delta x}$ $\frac{100 - 20}{1 - 3}$

$= \frac{80}{-2}$

$= -40$

Negative

D) $\frac{\Delta y}{\Delta x}$ $\frac{20 - 40}{3 - 4}$

$= \frac{-20}{-1}$

$= 20$

positive