## Lesson 3.4 Notes

Answer the following questions for $f(x)$.

1) What is $f(2)$ ?

$$
f(2)=6
$$

2) For what values, if any, does $f(x)=3$ ? $f(x)=3$ when $x=0$
3) What is the $x$-intercept? $(-2,0)$
4) What is the domain of $f(x)$ ? $[-4,6]$
5) What is the range of $f(x)$ ? $[-3,12]$
6) For what values, if any, does $f(x)=0$ ? $f(x)=0$ when $x=-2$
7) What is $f(4)$ ? $\quad f(4)=9$
8) On what intervals is $f(x)$ decreasing?
$f(x)$ is not decreasing


Consider the linear graph of $f(t)$ and the nonlinear graph of $g(t)$ to answer the questions.
9) Where is $f(t)=g(t)$ ? $f(t)=g(t)$ when $t=-2$ and $t=3$
10) Where is $f(t)>g(t) ? f(t)>g(t)$ on the interval $(-2,3)$
11) Which is greater: $f(0)$ or $g(-3) ? f(0)=1$ and $g(-3)=4$, so $g(-3)$ is greater.
12) What is the domain of $f(t)$ ? $[-4,4]$
13) What is the range of $g(t)$ ? $[-5,11]$
14) For what values does $g(t)=4$ ?

$$
g(t)=4 \text { when } t=-3 \text { and } t=3
$$


15) What is $f(1) ? \quad f(1)=2$

The following table of values represents two continuous functions, $f(x)$ and $g(x)$. Use the table to answer the questions.
16) What is $g(-3) ? \quad g(-3)=-5$
17) For what value(s) is $f(x)=0 ? f(x)=0$ when $x=1$ and $x=2$
18) For what values does $f(x)$ seem to be increasing? $f(x)$ seems to be increasing on the interval $(2,6)$.
19) What is $f(4) ? \quad f(4)=6$
20) For what value(s) is $g(x)=3$ ?

$$
g(x)=3 \text { when } x=-1
$$

| $x$ | $f(x)$ | $g(x)$ |
| :---: | :---: | :---: |
| -5 | 44 | -13 |
| -4 | 30 | -9 |
| -3 | 20 | -5 |
| -2 | 12 | -1 |
| -1 | 6 | 3 |
| 0 | 2 | 7 |
| 1 | 0 | 11 |
| 2 | 0 | 15 |
| 3 | 2 | 19 |
| 4 | 6 | 23 |
| 5 | 12 | 27 |
| 6 | 20 | 31 |

For each function find the indicated values.

1) Given: $g(x)=5 x-3$
a. $g(-1)=$

$$
\begin{gathered}
g(-1)=5(-1)-3 \\
g(-1)=-5-3 \\
g(-1)=-8
\end{gathered}
$$

b. $g(x)=12, x=$

$$
12=5 x-3
$$

$$
+3 \quad+3
$$

$$
15=5 x
$$

$$
\overline{5} \quad \overline{5}
$$

$$
3=x
$$

c. $g(10)=$

$$
\begin{gathered}
g(10)=5(10)-3 \\
g(10)=50-3 \\
g(10)=47
\end{gathered}
$$

d. $g(x)=-33, x=$

$$
\begin{gathered}
-33=5 x-3 \\
+3 \quad+3 \\
-30=5 x \\
\overline{5} \quad \overline{5}
\end{gathered}
$$

$$
-6=x
$$

2) 


a. $f(4)=$ $f(4)=1$
b. $f(x)=1, x=$ $f(x)=1$ when $x=4$
c. $f(0)=$ $\qquad$
d. Write the explicit rule for $f(x)$.

$$
f(x)=-\frac{3}{4} x+4
$$

$f(x)$
3)

a. $\quad h(-2)=$ $\overline{h(-2)}=-4$
b. $h(x)=-2, x=$ $\qquad$ $h(x)=-2$ when $x=-1$
c. $h(0)=$ $\qquad$
d. Write the explicit rule for $h(x)$.

$$
h(x)=\left(\frac{1}{2}\right)^{x} \cdot-1
$$

| $\boldsymbol{x}$ | $\boldsymbol{h}(\boldsymbol{x})$ |
| :--- | :--- |
| $\mathbf{- 2}$ | -4 |
| $\mathbf{- 1}$ | -2 |
| $\mathbf{0}$ | 1 |

For each graph state a) the interval(s) where it is increasing, decreasing, or constant, b) the minimum or maximum value (if it exists), c) identify the domain and range, d) intercepts, and e) determine whether the function is continuous, discrete or discontinuous. Use interval notation.
1)
a. Increasing: $(-4,0) \cup(4,5)$

Decreasing: $(1,3)$
Constant: None
b. Minimum: -4

Maximum: 2
c. Domain: $\quad[-4,0] \cup[1,3] \cup[4,5]$

Range: $\quad[-4,2]$
d. $x$-intercept(s): $(0,0),(1,0), \&\left(4 \frac{1}{2}, 0\right)$
$y$-intercept: $\quad(0,0)$
e. Circle one:

Continuous


2)
a. Increasing: None

Decreasing: $\quad(-\infty, \infty)$
Constant: None
b. Minimum: $-\infty$

Maximum: $\infty$
c. Domain: $(-\infty, \infty)$

Range: $\quad(-\infty, \infty)$
d. $x$-intercept(s): $(2,0)$
$y$-intercept: $\quad\left(0, \frac{2}{3}\right)$
e. Circle one:

Continuous
Discrete Discontinuous
3)
a. Increasing: $(-\infty, 3)$

Decreasing: None
Constant: None
b. Minimum: $-\infty$

Maximum: 3
c. Domain: $(-\infty, 3)$

Range: $\quad(-\infty, 3)$
d. $x$-intercep ts): $\left(\frac{3}{5}, 0\right)$

$y$-intercept: $\quad\left(0,-\frac{3}{4}\right)$
e. Circle one:

Continuous
Discrete
Discontinuous
4)
a. Increasing: None

Decreasing: $(0, \infty)$
Constant: None
b. Minimum: 0

Maximum: 1
c. Domain: $(0, \infty)$

Range: $\quad(1,0)$
d. $x$-intercepts): None
$y$-intercept: None
e. Circle one:



Discrete Discontinuous

Create a graph that uses the given conditions.

1) The function is increasing from $(-5,3)$. The function has a domain from $[-5,10)$. The function has a minimum value of 0 and a maximum value of 3 .

2) The function has one interval of increasing, two intervals of decreasing, and one constant interval. The function has a range of $[-7,5]$.


Answer the following questions for $f(x)$.

1) $f(4)=$ $\qquad$
The 4 is an $x$-value, so when $x=4$, the $y$-value is 9 .
So, $f(4)=9$
2) $f(-4)=$ $\qquad$
The -4 is an $x$-value, so when $x=-4$, the $y$-value is -3 .
So, $f(-4)=-3$
3) $f(x)=3, x=$ $\qquad$
The 3 is a $y$-value, so when $y=3$, the $x$-value is 0 .

$f(x)=3, x=0$
4) $f(x)=0, x=$ $\qquad$
The 0 is a $y$-value, so when $y=0$, the $x$-value is -2 .
$f(x)=0, x=-2$
For each situation use the given function to find and interpret solutions
Hope has been tracking the progress of her family as they travel across the country. She knows they are driving 78 miles per hour. During their vacation she has created a function, $d(t)=78 t$, to model the progress they are making.
a. What would Hope be attempting to find if she writes $d(4)$ ?

Hope would be attempting to find the distance traveled in 4 hours.
b. What would the expression $d(t)=450$ mean in this situation?

The expression means that the distance traveled is 450 miles.
c. What would the expression $d(3.5)$ mean?

The expression means that the family has traveled for 3.5 hours.
d. What would Hope write if she wanted to write a rule for the time it takes to travel 800 miles?

Hope would write $d(t)=800$.
e. Find the time it would take to travel 800 miles.
$800=78 t \quad \frac{800}{78}=\frac{78 t}{78} \quad 10.26 \approx t \quad$ It would take about 10.26 hours.
f. How would Hope indicate that her family had been traveling for 10 hours?

Hope would write $d(10)$.

Determine whether each defines a function.

1) Does the set of ordered pairs define a function?

$$
\{(6,2),(10,4),(8,4),(6,5),(9,8)\}
$$

The ordered pairs do not define a function because the $x$-value of 6 is paired with two $y$-values.
2) Does the set of ordered pairs define a function?

$$
\{(0,2),(1,4),(4,2),(5,7),(6,7),(-1,3),(3,-1)\}
$$

The ordered pairs do define a function because no $x$-value is paired with more than one $y$-value.

