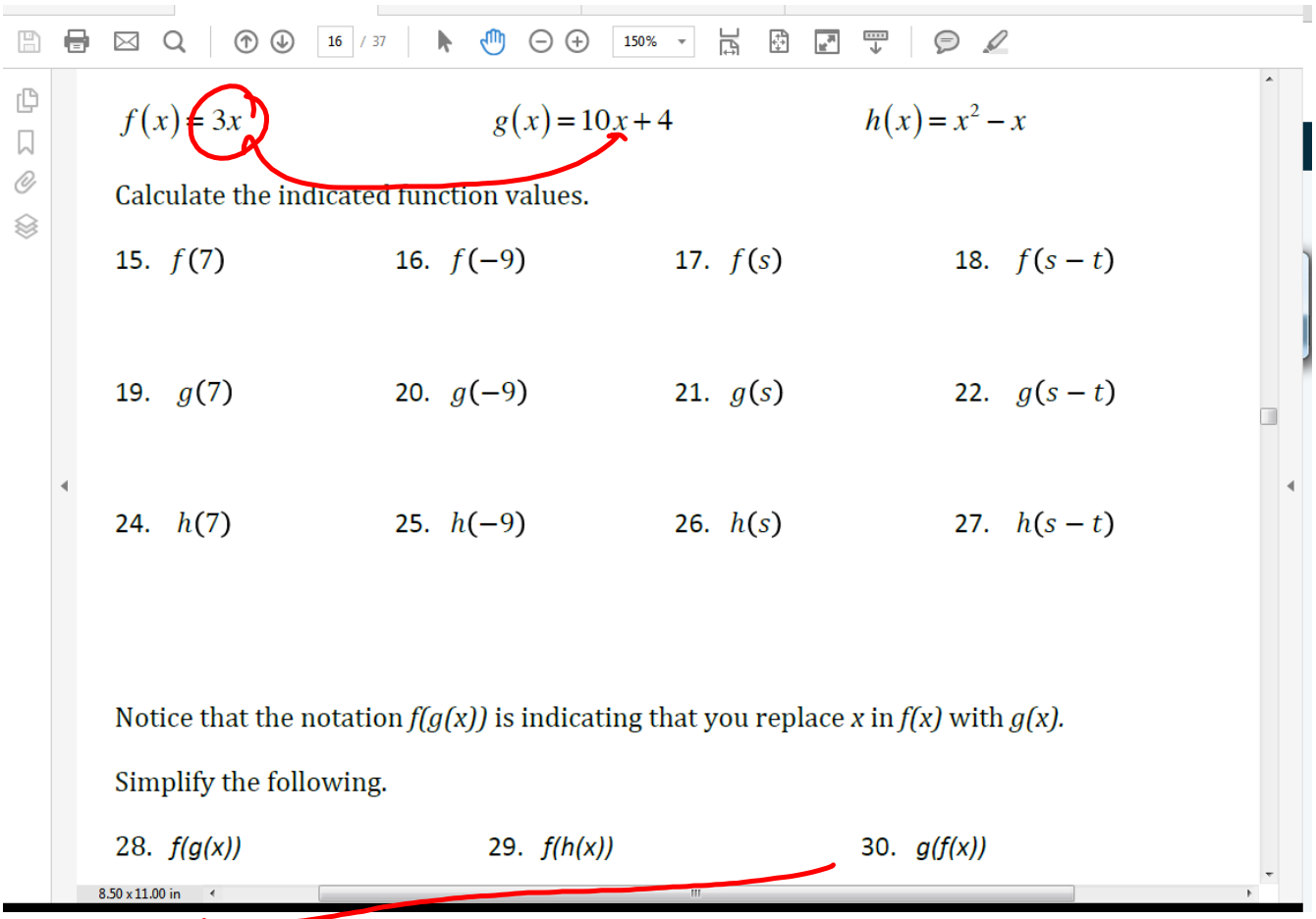
NO QUIZ TODAY!

I will check 1.2 Homework soon!

Go ahead and begin 1.3 on pg.17 and I will check your homework as soon as I get attendance taken!



$f(x) = 3x$ $g(x) = 10x + 4$ $h(x) = x^2 - x$

Calculate the indicated function values.

15. $f(7)$ 16. $f(-9)$ 17. $f(s)$ 18. $f(s-t)$

19. $g(7)$ 20. $g(-9)$ 21. $g(s)$ 22. $g(s-t)$

24. $h(7)$ 25. $h(-9)$ 26. $h(s)$ 27. $h(s-t)$

Notice that the notation *f(g(x))* is indicating that you replace *x* in *f(x)* with *g(x)*.

Simplify the following.

28. *f(g(x))* 29. *f(h(x))* 30. *g(f(x))*

$g(3x) = 10(3x) + 4$

$30x + 4$

1.3 Tracking the Tortoise

A Solidify Understanding Task

You may remember a task from last year about the famous race between the tortoise and the hare. In the children's story of the tortoise and the hare, the hare mocks the tortoise for being slow. The tortoise replies, "Slow and steady wins the race." The hare says, "We'll just see about that," and challenges the tortoise to a race.

In the task, we modeled the distance from the starting line that both the tortoise and the hare travelled during the race. Today we will consider only the journey of the tortoise in the race.

Because the hare is so confident that he can beat the tortoise, he gives the tortoise a 1 meter head start. The distance from the starting line of the tortoise including the head start is given by the function:

tortoise

$d(t) = 2^t$ (d in meters and t in seconds)

The tortoise family decides to watch the race from the sidelines so that they can see their darling tortoise sister, Shellie, prove the value of persistence.

1. How far away from the starting line must the family be, to be located in the right place for Shellie to run by 10 seconds after the beginning of the race? After 20 seconds?

$d(10) = 2^{10}$ $d(10) = 1024$ m

$d(20) = 2^{20}$ $d(20) = 1{,}048{,}576$ m

2. Describe the graph of $d(t)$, Shellie's distance at time t. What are the important features of $d(t)$?

(5 mins)

Domain: $[0, 300]$

Range: $[0, 2.04 \times 10^{90}]$

if we limit Shellie's race to 5mins, not ∞ minutes.

Increasing, continuous, exponential, passes through $(0,1)$.

3. If the tortoise family plans to watch the race at 64 meters away from Shellie's starting point, how long will they have to wait to see Shellie run past?

$64 = 2^t$

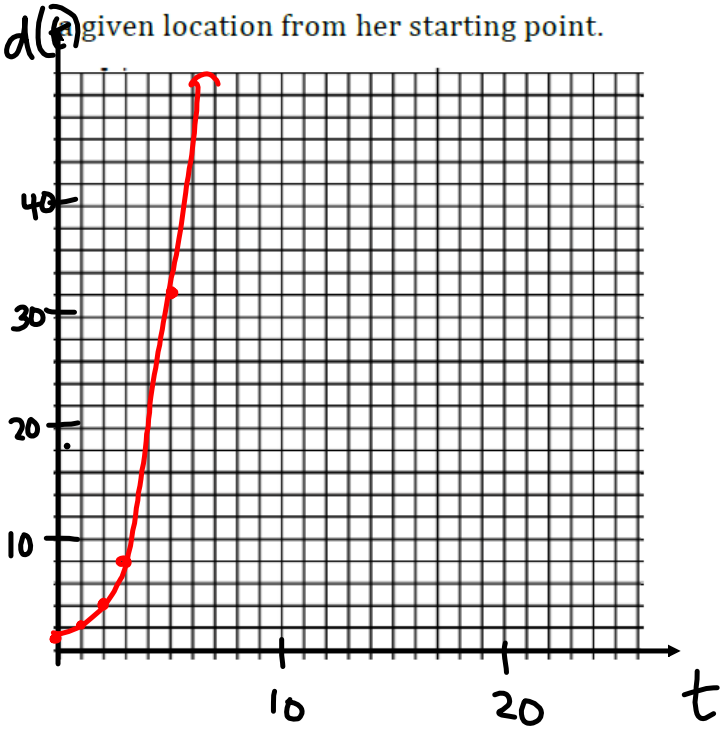
$t = 6$ seconds

4. How long must they wait to see Shellie run by if they stand 1024 meters away from her starting point?

$1024 = 2^t$

$t = 10$ seconds

5. Draw a graph that shows how long the tortoise family will wait to see Shellie run by at given location from her starting point.



t	d(t)
0	1
1	2
2	4
3	8
4	16
5	32

6. How long must the family wait to see Shellie run by if they stand 220 meters away from her starting point?

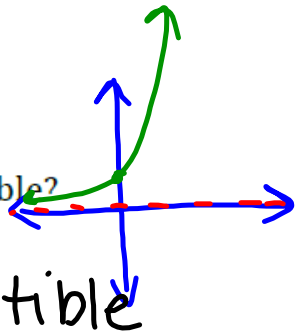
bet. 7 & 8

7. What is the relationship between $d(t)$ and the graph that you have just drawn? How did you use $d(t)$ to draw the graph in #5?

they are the same . . .

8. Consider the function $f(x) = 2^x$.

A) What are the domain and range of $f(x)$? Is $f(x)$ invertible?



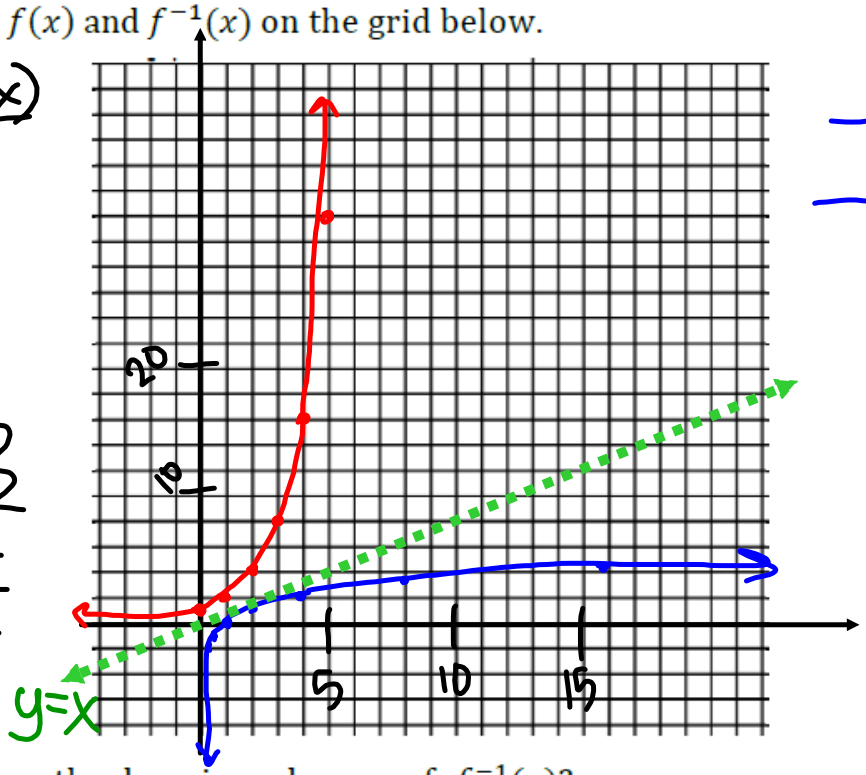
domain: $(-\infty, \infty)$

range: $(0, \infty)$

yes, f(x) is invertible

B) Graph $f(x)$ and $f^{-1}(x)$ on the grid below.

x	f(x)
0	1
1	2
2	4
3	8
4	16
5	32
-1	$\frac{1}{2}$
-2	$\frac{1}{4}$



$f^{-1}(x)$

x	f(x)
1	0
2	1
4	2
8	3
16	4
32	5
$\frac{1}{2}$	-1
$\frac{1}{4}$	-2

C) What are the domain and range of $f^{-1}(x)$?

domain: $[0, 2.04 \times 10^{90}]$

range: $[0, 300]$

9. If $f(3) = 8$, what is $f^{-1}(8)$? How do you know?

$(3,8) \rightarrow (8,3)$

$f^{-1}(8) = 3$

10. If $f\left(\frac{1}{2}\right) = 1.414$, what is $f^{-1}(1.414)$? How do you know?

$\left(\frac{1}{2}, 1.414\right) \rightarrow (1.414, \frac{1}{2})$

$f^{-1}(1.414) = \frac{1}{2}$

11. If $f(a) = b$ what is $f^{-1}(b)$? Will your answer change if $f(x)$ is a different function? Explain.

$(a,b) \rightarrow (b,a)$

$f^{-1}(b) = a$

Yes, $f^{-1}(b)$ will always equal a.

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Solve for the value of x.

1. $5^{x+1} = 5^{2x-3}$ $x+1=2x-3$
2. $7^{3x-2} = 7^{-2x+8}$
3. $4^{3x} = 2^{2x-8}$
4. $3^{5x-4} = 9^{2x-3}$
5. $8^{x+1} = 2^{2x+3}$ $2^{3(x+1)} = 2^{2x+3}$ $3(x+1) = 2x+3$
6. $5^{x} = \frac{1}{125}$
7. $3^{x+1} = \frac{1}{81}$

Set

Topic: Writing the logarithmic form of an exponential equation.

Definition of Logarithm: *For all positive numbers a, where a ≠ 1, and all positive numbers x,*

$y = \log_a x$ *means the same as* $x = a^y$.

(Note the ***base*** *of the exponent and the* ***base*** *of the logarithm are both* ***a****.)*

8. Why is it important that the definition of logarithms states that the base of the logarithm doe not equal 1?

9. Why is it important that the definition states that the base of the logarithm is positive?

10. Why is it necessary that the definition states that **x** in the expression $\log_a x$ is positive?

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$a^y = x$

$2^3 = 8$

$\log_2 8 = 3$

$\log_a x = y$

$\log_3 81 = 4$

$3^4 = 81$

$\log_3 27 = 3$

b/c $3^3 = 27$

Homework/Classwork

Finish 1.3

Oct 21-8:47 AM