

10/11/23 + 10/12/23 Properties of Logs  
HW Due

No class on Friday!  
Work on I.F

We would really like a way to solve  $P = ab^t$  for  $t$ !  
Defn: let  $b \neq 1$  be a positive number, then the function

$$f(t) = \log_b(t)$$

is called a logarithm with base  $b$ .

What does this mean

English:  $\log_b(t)$  is the power of  $b$  which yields  $t$ .

Math:  $x = \log_b(y)$

These are  
the same  
thing

$$x = \log_b(y) \Leftrightarrow b^x = y$$

Warning:  $\log_b(-)$  is a function!  $\log_b(7)$  makes sense  
but  $7\log_b$  does not  
it needs an input!

#1 Do a) and then  $b, c$

- |      |        |         |
|------|--------|---------|
| a) 0 | d) 2   | } 3 min |
| b) 2 | e) -2  |         |
| c) 4 | f) 3.2 |         |

3# #2 ~~Read~~ Think about them do on the board

Notation:

$$\log(-) := \log_{10}(-)$$

$$\ln(-) := \log_e(-)$$

#4 } ~~2~~ min 10 min  
#5 }  
#6 }

~~#6~~

### Key Properties of Logs

1)  $\log_b(1) = 0$

2)  $\log_b(b) = 1$

3)  $\log_b(xy) = \log_b(x) + \log_b(y)$

4)  $\log_b\left(\frac{x}{y}\right) = \log_b(x) - \log_b(y)$

5)  $\log_b(x^k) = k \log_b(x)$  ← Bring powers down

6)  $\log_b(b^y) = y$

7)  $b^{\log_b(x)} = x$

INVERSE  
of  
 $b^x$

like the french!

$$\log(ab^t)$$

$$= \log(a) + t \log(b)$$

We can use these to find / simplify logs!

#7

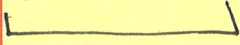
a) ~~6~~ 6

d)  $\frac{1}{2} \cdot 3$

e)  $\frac{1}{3}$

2 min for the rest!

8, 9, 10



Rest of class

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Thursday: Review

- Do 11 together Book
- Why are logs useful? They bring down powers!

Recall

1

$$b^{\log_b(x)} = x \quad \text{and} \quad \log_b(b^y) = y$$

#2 a) b) c)

Board

~~Home~~

Do rest of R +13+14.