Compound interest example(s)

one error this side

Definition of a logarithm

a logarithmic function is the inverse of an exponential function.

the log <u>is</u> the exponent (the output of the log function is the exponent)

we use logs to solve for exponents

Logarithmic vs. exponential form

$$\log_b x = a \longleftrightarrow b^a = x$$

Example: convert $\log_2 8 = 3$ to exponential form.

answer: $3^2 = 8$

Example: convert $4^x = y$ to logarithmic form.

answer: $\log_4 y = x$

Notation and vocab: $\log_b x = a$

b is the base (same as the base of the exponent)

a is the exponent

x is the "answer" when you do b^a

Fun facts about $\log_b x$:

$\log_b b = 1$ because $b^1 = b$

$\log_b 1 = 0$ because $b^0 = 0$

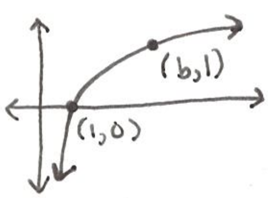
$\log_b b^n = n$ because $b^n = b^n$

b must be positive and $b \neq 1$, otherwise $\log_b x$ is undefined

one error in each half

Graphs of logarithmic functions

Graph of $f(x) = \log_b x$



domain: $x > 0$ or $(0, \infty)$

asymptote: $x = 0$

like an exponential curve, but reflected

always increasing, but increases slower as x gets larger

x-intercept is (1,0)

asymptote is y-axis, or $x = 0$ (the graph gets close to it but never touches)

a smaller base b makes a sharper corner

Graph of $g(x) = k + \log_b (x - h)$

same as the graph of $f(x) = \log_b x$, except:

- translated up k units (or down if k is negative)
- translated to the right h units (or left if it's like x+#)
- vertical asymptote is $x = h$
- point (1,0) moves to $(1+h, k)$
- point (b,1) moves to $(b+h, 1+k)$