Problem 1

Gage and Logan are racing to see who can earn the most money in their investments. They agreed to deposit 100 dollars each at the start.

(a) Gage chooses a bank that has a nominal rate of 5% and compounds weekly. Find the function $G(t)$ that gives the amount of money Gage has after t years.

(b) What is the growth factor of Gage's bank? What is the effective annual rate for his bank?

(c) How long will it take for Gage's investment to double?

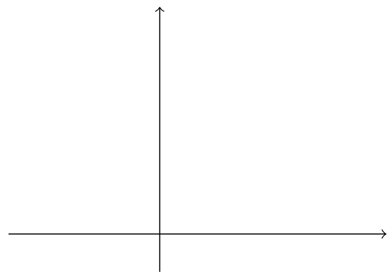
(d) Logan chooses a bank that has a nominal rate of 7% compounds monthly. Find the function $L(t)$ that gives the amount of money Logan has after t years.

(e) What is the growth factor of Logan's bank? What is the effective annual rate for his bank?

(f) Dane decides to join in on the fun and invests 100 dollars in a bank that continuously compounds at a nominal rate of 6%. What is the effective annual rate for his bank?

Good luck :]

(g) Roughly sketch the functions for Gage's, Logan's, and Dane's investment on the same axis. Make sure to label which line is who.



(h) Whose bank has the highest effective annual rate?

(i) Jake decides that he wants to invest in the bank that's winning (the one with the best effective annual growth rate). How much should Jake invest at the beginning so he can have 500 dollars after 5 years?

Problem 2

(a) Solve for x in the following equation: $\ln(50e^{0.5x}) = 2$.

(b) Solve for x in the following equation: $13(17)^x = 767$.

(c) Solve for x in the following equation: $\log(x^3) + \log(x^7) = 40$.

Good luck :]

Problem 3

Alexa is collecting seashells from the imaginary beach in Nebraska. At the start, she only has 4 seashells. She forgot to record how many she got on the next few days, but on the 5th day, she has 29 seashells.

(a) If Alexa's collection was growing *linearly*, write down the function $S = f(t)$ that would model how many seashells she has on Day t? (t being the days since she started her collection.)

(b) Find the inverse function $f^{-1}(S)$ of the function you found in part (a).

(c) Interpret what $f^{-1}(100)$ means in the context of the problem.

(d) Mia believes the collection was growing *exponentially*, write down the exponential function $g(t)$ that would model how many seashells Alexa has on Day t?

Problem 4

Consider the piecewise function below $f(x) = \begin{cases} 7 & , \ -5 < x < 0 \\ 2^x & , \ 0 < x \leq 3 \\ 3x - 1 & , \ x > 3 \end{cases}$.

(a) Evaluate $f(3)$.

$f(3) = \boxed{}$

(b) Evaluate $f(-4)$.

$f(-4) = \boxed{}$

(c) Evaluate $f(5)$.

$f(12) = \boxed{}$

(d) What is the domain of this function?

Good luck :]

Problem 5

(a) Find the inverse $f^{-1}(y)$ of $f(x) = 10e^{3x}$.

(b) What is the domain and range of $f(x)$ from part (a).

Domain of $f(x)$: $\boxed{}$ Range of $f(x)$: $\boxed{}$

(c) What is the domain and range of $f^{-1}(y)$ from part (a).

Domain of $f^{-1}(y)$: $\boxed{}$ Range of $f^{-1}(y)$: $\boxed{}$

Problem 6

A sound's noise level is measured in decibels (dB) by comparing the sound's intensity I, to a benchmark sound that has intensity 10^{-16} watts/cm^2. In particular, the amount of decibels given an intensity is

$$\text{dB} = 10\log(I/10^{-16}) = 10\log(10^{16}I)\ .$$

(a) Someone (=.=) whispered in 101C on Wednesday, October 12th. The sound level was 20 dB. How intense was the whisper?

(b) If someone spoke at a sound level of 40 dB, how intense would this be?

(c) Using you answer in part (a) and (b), by what percent do you have to increase the intensity to double the decibel level?

Good luck :]

Problem 7

(a) Consider the following table.

x	-2	-1	0	1	2
$h(x)$	2.958	3.846	5	6.5	8.45

Is the following table a exponential function? If so, find the equation for it.

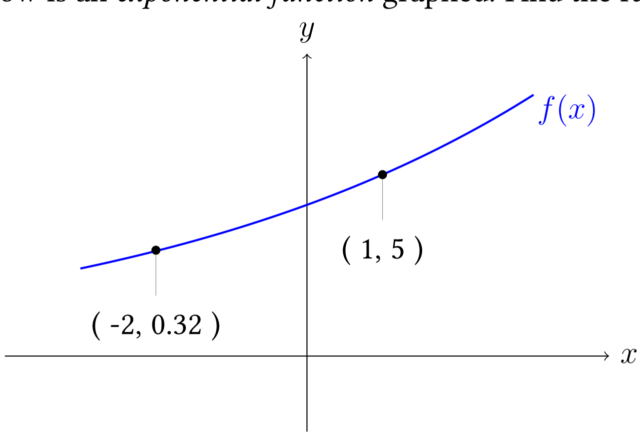
(b) Consider the following table.

t	0	1	2	3	4
$g(t)$	3	4.05	5.4675	9.3811	10.5741

Is the following table a exponential function? If so, find the equation for it.

Problem 8

Below is an *exponential function* graphed. Find the function $f(x) = a(b)^x$ that models this graph.



Good luck :]