minder: Exponential Functions have the form $\boxed{f(x) = a \cdot b^x}$ where $a \neq 0, b \neq 1$, and $b > 0$

When will b be the "growth rate"? $b>1$

When will b be the "decay rate"? $0<b<1$

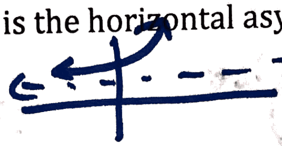
1. Use the function $f(x) = 3 \cdot 5^x$

   a, What is $f(x+2)$ written out as a new function? $g(x)=3 \cdot 5^{x+2}$

   b. Write your new function in the form $f(x) = a \cdot b^x$ to highlight the y-intercept.

   $f(x) = 75 \cdot 5^x$

   c. SKETCH a graph of $f(x)+2$. What is the horizontal asymptote?

   $y=2$

   d. What is the end behavior for $-f(x)$?

   As $x \to \infty$, $f(x) \to -\infty$
   As $x \to -\infty$, $f(x) \to 0$

   e. What is the average rate of change for $f(x)$ on the interval $[-1, 2]$?

   $(-1, 3/5)$ $(2, 75)$ $\frac{75 - 3/5}{2-(-1)}$ $\frac{74\,2/5}{3} \to 24.8$

2. Write a function for this table:

x	y
-2	1/5
-1	1
0	5
1	25
2	125

$f(x) = 5^{x+1}$
$f(x) = 5^1 \cdot 5^x$

3. In the absence of predators, the growth rate of rabbits is 4% per year. A population begins with 100 rabbits.

   a. Write a function to model this situation: $f(x) = 100(1.04)^x$

   b. How long will it take for the population to double?

   ≈ 18 years

ompound Interest

$$A = P\left(1+\frac{r}{n}\right)^{nt}$$

Where,

- P = principal amount (initial investment)
- r = annual nominal interest rate (as a decimal)
- n = number of times the interest is compounded per year
- t = number of years

Write a function for the following:

1. \$25,000 invested at a rate of 6% compounded annually for 12 years.

$A = 25{,}000\left(1+\frac{.06}{1}\right)^t$

$25{,}000(1+.06)^t$

2. \$40,000 invested at a rate of 12% compounded monthly

↳ annual amt

write a function with 12*t* as your exponent.	write a function with *t* as your exponent.
$A = 40{,}000\left(1+\frac{.12}{12}\right)^{12t}$ $40{,}000(1+.01)^{12t}$ $A = 40{,}000(1.01)^{12t}$	$A = 40{,}000\left[(1.01^{12})^t\right]$ $A = 40{,}000(1.12683)^t$

Evaluate both functions for 5 years:

\$72,667.87

3. \$125,000 invested at a rate of 6% compounded quarterly (4 times a year)

write a function with 4*t* as your exponent.	write a function with ~~*t* as your exponent~~.
$A = 125{,}000\left(1+\frac{.06}{4}\right)^{4t}$ $A = 125{,}000(1.015)^{4t}$	$A = 125{,}000(1.06136..)^t$

Evaluate both functions for 3 years.

\$149,452.27

4. Why do you get more money when compounding an interest rate of 7% monthly instead of annually?

getting interest on the interest

Exponential Functions Day 5

1. State the domain, range, end behavior, y-intercept and asymptote for: $f(x) = -2(5)^{2x}$

Domain: ______________

Range: ______________

End Behavior: ______________________________

y-intercept: __________

Asymptote: __________

2. SKETCH $y = 3^x + 2$. Make sure and sketch the asymptote as well.

End Behavior:

Range (Interval Notation):

3. Create a table of values from [-2, 2] for $g(x) = 2^{2x} + 4$

x	g(x)

4. Write the exponential function for the following coordinates: (-2, 1/64), (-1, 1/8), (0, 1), (1, 8), (2, 64)

5. If $f(x) = 5^x$ and $g(x) = \frac{1}{2} \cdot 5^{x-4} + 1$ Create the new table of values from the original table.

x	f(x)	x	g(x)
-2	1/25		
-1	1/5		
0	1		
1	5		
2	25		

6. An acidophilus culture containing 150 bacteria doubles in population every hour. Write a function representing the bacteria population for every hour that passes. Find the population of bacteria after 12 hours.

A. ______________________ B. ______________

7. A softball dropped onto a hard surface from a height of 25 inches rebounds to about 2/5 the height on each uccessive bounce. Write a function representing the rebound height for each bounce