

Homework Answers

Section 1.2 (page 19): (10 problems)

32	44
34	
42	52

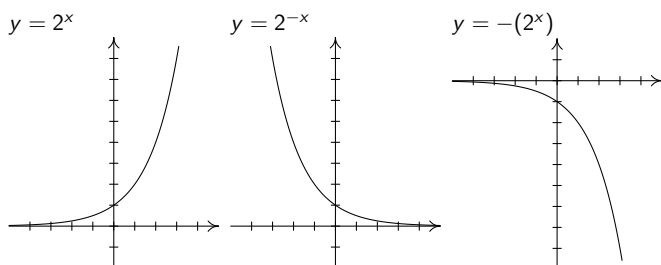
Notes

Exponential Functions - Overview

- Estimating time frames using the graphing calculator
- Exponential Growth - Saving money
- Exponential Decay - Cyanide Poisoning

Notes

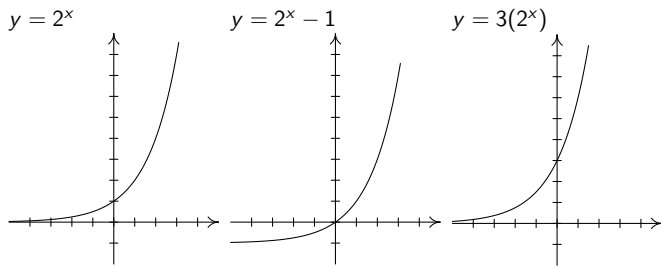
Recognizing Graphs of Exponential Functions



Notes

Recognizing Graphs of Exponential Functions

Notes



Exponential Function Overview

Notes

Definition (Exponential Function)

Let a be a positive real number that is not 1. Then the function

$$f(x) = a^x$$

is the exponential function with base a .

For the basic exponential function $f(x) = k \cdot a^x + b$, the following hold:

- $a > 0$
- Domain is $(-\infty, \infty)$
- Range is (b, ∞) if $k > 0$,
 $(-\infty, b)$ if $k < 0$
- y-intercept is k
- If $a > 1$ the function is increasing, else it is decreasing.
(Assume $k > 0$. What if $k < 0$?) (Hint: Consider that $2^{-x} = (\frac{1}{2})^x$, and $a = \frac{1}{2} < 1$)

Finding Zeros

Notes

Definition (Zero)

The zeroes of a function $f(x)$ are the values of x so that $f(x) = 0$. These are also known as the roots or x-intercepts of the function.

Example (Find the zero for $f(x) = 5 - 2.5^x$)

- Graph the function, and set the window size to $[-5, 5]$ by $[-5, 5]$
- Select the Zero function ($\boxed{2\text{nd}} \boxed{\text{trace}} \boxed{2}$)
- Select left and right bounds, and a guess.
- Read off the answer: $X = 1.7564708 = 1.756$

Practice Finding Zeros

Notes

Practice Problem

For each of the following functions, use the graphing calculator to find the zero.

1. $f(x) = 2^x - 5$
 $X = 2.322$
2. $f(x) = 3^x - 0.5$
 $X = -0.631$

Solving for x

Notes

Example (Solving for x when $5 = 2.1^x$)

- Graph the functions $y1 = 2.1^x$ and $y2 = 5$, and set the window size to $[-5,5]$ by $[-1,6]$
- Select the Intersect function ($\boxed{2nd} \boxed{trace} \boxed{5}$)
- Select the first and second functions, and a guess.
- Read off the answer: $X = 2.169237 = 2.169$ and $Y = 5$

Practice Solving for x

Notes

Practice Problem

For each of the following functions, use the graphing calculator to solve for x .

1. $2 = 1.2^x$
 $X = 3.802$
2. $0.1 = 3^x$
 $X = -2.096$

Calculating Interest

Notes

Definition (Calculating interest)

$$P = P_0 \left(1 + \frac{r}{n}\right)^{nt}$$

- P_0 - Principal or original amount
- r - Rate of interest, usually expressed as an annual rate
- n - Number of times interest is compounded
- t - Amount of time that interest is paid over
- P - Final amount

Calculating Interest Example

Notes

Example (Jay invests \$5000, at 6% interest, compounded monthly. When will Jay have \$12000?)

- The unknown is t
- $12000 = 5000 \left(1 + \frac{0.06}{12}\right)^{12x}$ - Setting up the equation
- $\frac{12000}{5000} = 2.4 = (1.005)^{12x}$ - Simplifying the equation
- Graph $y_1 = 1.005^x$ and $y_2 = 2.4$
- Find the point of intersection $X = 14.628$

Exponential Decay

Notes

Example (The half-life of cyanide in the human bloodstream is 1 hour: if Bobby has 5mg of cyanide in her blood after 24 hours, how much cyanide did she ingest originally?)

- A half-life of 1 hour means the rate is 0.50, and the amount is halved 24 times.
- $5 = x(0.5)^{24}$ or $\frac{5}{0.5^{24}} = x$
- $X = 83886080$ mg or $X = 83886.08$ grams.

Homework

Section 1.3 (page 26 - 27):

13
14
15
16
17
18
22
26
28
32

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