Warm Up #8

Evaluate the expression without using a calculator.

1. 5^{-2}
2. $8^{2/3}$
3. $-3 \cdot 4^{3/2}$
4. State the domain and range of the function $y = -(x - 2)^2 + 3$.

ANSWERS

Warm-Ups: 1. $\frac{1}{25}$ 2. 4 3. -24

4. domain: all real numbers; range: $y \leq 3$

Ch.7 Section 1

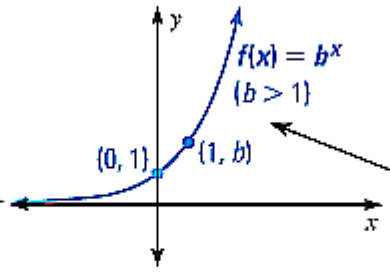
Objective: Graph and use exponential growth functions.

An **exponential function** has the form $y = ab^x$ where $a \neq 0$ and the base b is a positive number other than 1. If $a > 0$ and $b > 1$, then the function $y = ab^x$ is an **exponential growth function**, and b is called the **growth factor**. The simplest type of exponential growth function has the form $y = b^x$.

KEY CONCEPT

Parent Function for Exponential Growth Functions

The function $f(x) = b^x$, where $b > 1$, is the parent function for the family of exponential growth functions with base b. The general shape of the graph of $f(x) = b^x$ is shown below.



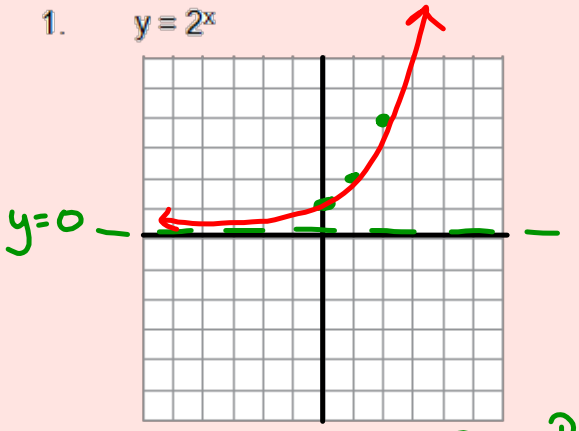
The x-axis is an **asymptote** of the graph. An asymptote is a line that a graph approaches more and more closely.

The graph rises from left to right, passing through the points (0, 1) and (1, b).

The domain of $f(x) = b^x$ is all real numbers. The range is $y > 0$.

Graph the function, identify the asymptote, and state the domain and range.

1. $y = 2^x$

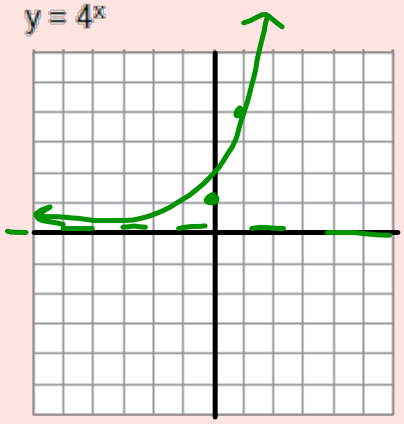


x	y
0	1
1	2
2	4

D: $\mathbb{R}$

R: $y > 0$

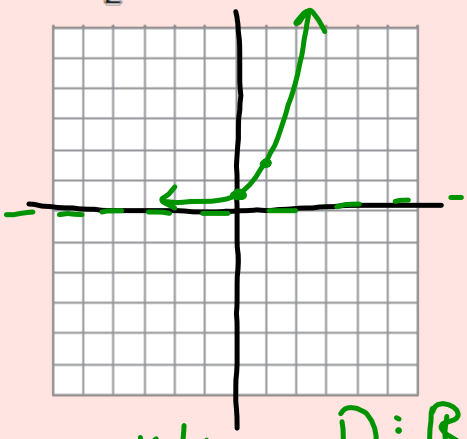
2. $y = 4^x$



D: $\mathbb{R}$

R: $y > 0$

3. $y = \frac{1}{2} \cdot 3^x$

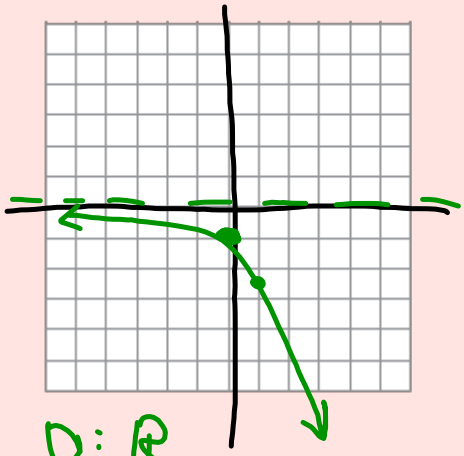


x	y
0	$\frac{1}{2}$

D: R

R: $y > 0$

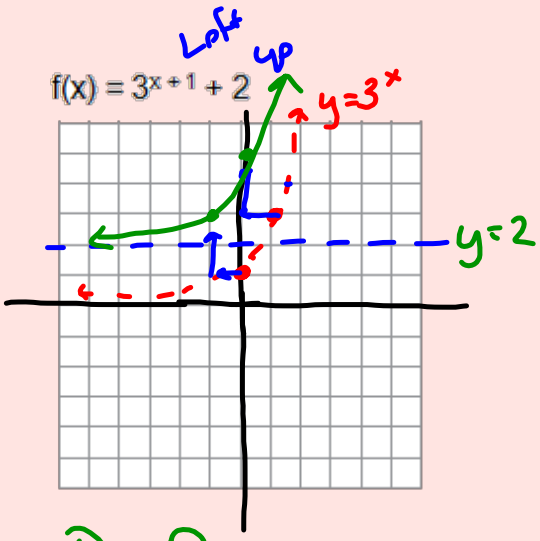
4. $y = -\left(\frac{5}{2}\right)^x$



D: R

R: $y < 0$

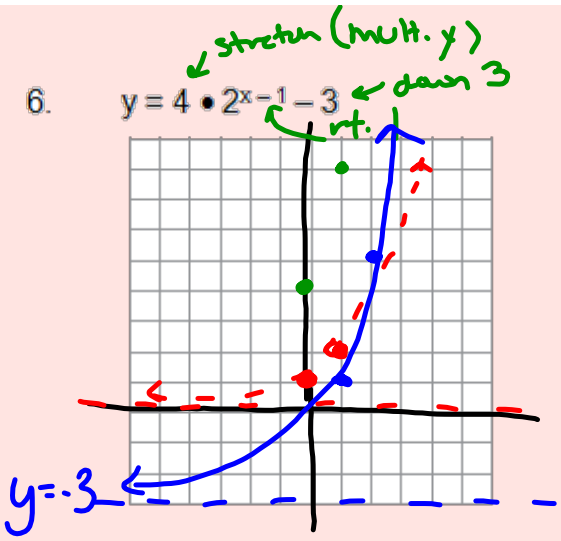
5. $f(x) = 3^{x+1} + 2$



D: R

R: $y > 2$

6. $y = 4 \cdot 2^{x-1} - 3$



D: R

R: $y > -3$

KEY CONCEPT

Compound Interest

Consider an initial principal P deposited in an account that pays interest at an annual rate r (expressed as a decimal), compounded n times per year. The amount A in the account after t years is given by this equation:

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

P

7. You deposit $4000 in an account that pays 2.92% annual interest. Find the balance after 1 year if the interest is compounded quarterly? Daily?

$n = 4, 365$

$P = 4000$

$r = 0.0292$

$t = 1$

$A = 4000\left(1 + \frac{0.0292}{4}\right)^{4 \cdot 1}$

Quarterly: $A = \$4118.09$

Daily: $A = \$4118.52$

KEY CONCEPT

Compound Interest

Consider an initial principal P deposited in an account that pays interest at an annual rate r (expressed as a decimal), compounded n times per year. The amount A in the account after t years is given by this equation:

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

8. You deposit $2000 in an account that pays 4% annual interest. Find the balance after 3 years if the interest is compounded daily.

$P = 2000$

$r = 0.04$

$n = 365$

$$A = 2000\left(1 + \frac{0.04}{365}\right)^{365(3)}$$

$$A = 2254.98$$

Homework:

7.1 (3-27 threes, 29)