Section 8-7: Exponential Functions

An equation that has a variable in the exponent is called and EXPONENTIAL FUNCTION

Form of an Exponential Functions:

$y = a \cdot b^x = a(b)^x$

a: Can't be zero

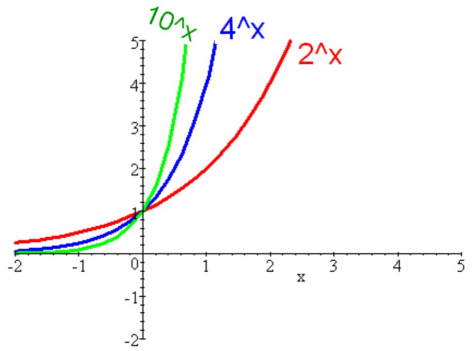
b: Greater than zero but not equal to 1

x: Any real number

Graph these on your calculator using the following window:

X_{min}=-2 X_{max}=5 Y_{min}= -2 Y_{max} =5

Y_1 = 2^x Y_2 = 4^x Y_3 = 10^x

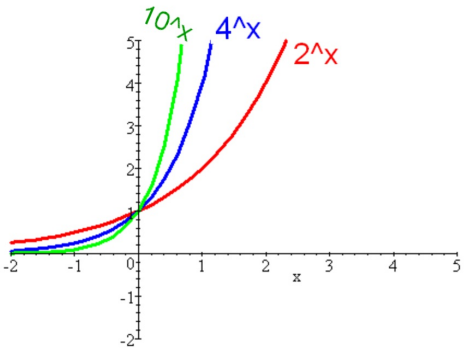


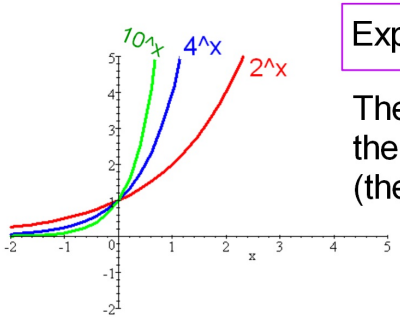
These are all Exponential Functions of the form: $y = a(b)^x$

a is the coefficient b is the base

These functions all represent Exponential Growth

b>1





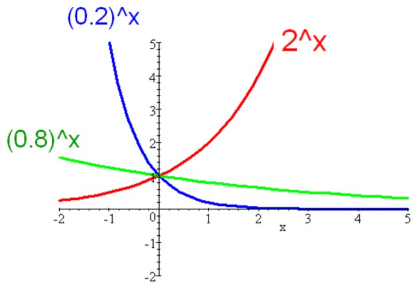
Exponential Growth

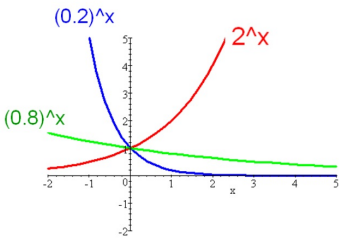
The bigger the base
the steeper the graph
(the faster is grows).

Graph these on your calculator using the following window:

X_{min}=-2 X_{max}=5 Y_{min}= -2 Y_{max} =5

Y_1 = 2^x Y_2 = (0.2)^x Y_3 = (0.8)^x





Exponential Decay

The smaller the base
the steeper the graph
(the faster is decays).

$y = a(b)^x$

If b=1 the graph is a Horizontal Line

The closer b is to 1the
FLATTER the graph becomes.

Sec 8-7: Graphs of Exponential Functions

Notes

When b>1 the graph is Exponential Growth.

When 0<b<1 the graph is Exponential Decay.

Exponential Growth:

- The larger the value of b the steeper the graph.

  (the faster it goes up)

- The closer the value of b is to 1 the flatter the graph.

- If b=1 then the graph is a Horizontal Line.

For Exponential Decay:

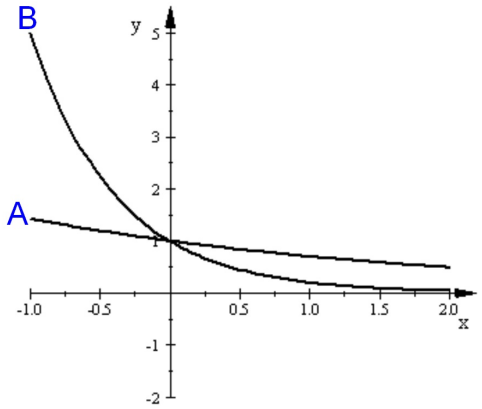
The smaller the base (closer to zero) the steeper the graph.

(the faster it goes down)

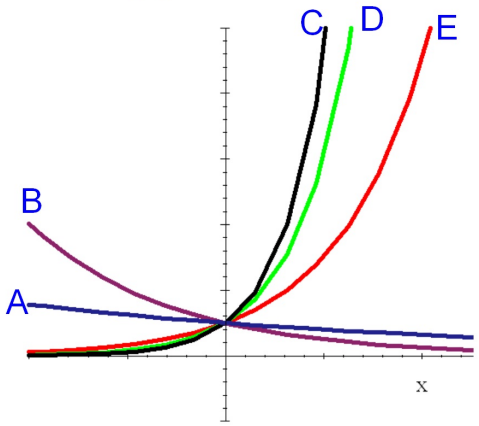
The closer the value of b is to 1 the flatter the graph.

1. $y = (0.2)^x$ B

2. $y = (0.7)^x$ A



$y = 6^x$ D $y = 0.5^x$ B $y = 9x$ C $y = 0.8^x$ A $y = 3^x$ E

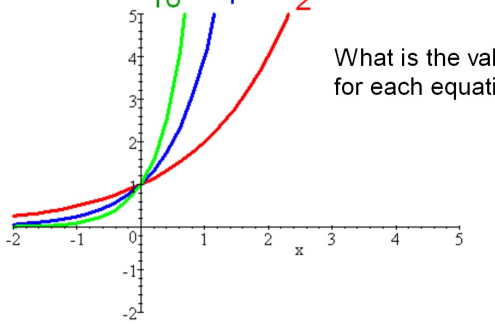


$y = a(b)^x$

What is the y-intercept for each graph? 1

Why do these all go through the point (0,1)?

$Y_1 = 2^x$ $1 \cdot 2^x$ $Y_2 = 4^x$ $1 \cdot 4^x$ $Y_3 = 10^x$ $1 \cdot 10^x$



What is the value of a for each equation? 1

Explore how changing the value of a affects the graph of $y = a(b)^x$

Leave $Y_1 = 2^x$ What is the value of a in this equation? 1

In Y_2 try graphing other equations of the form $Y = a(2)^x$

But change the value of a.

What affect does different values of a have on the graph?

changes y-intercept

$Y = a \cdot b^x$

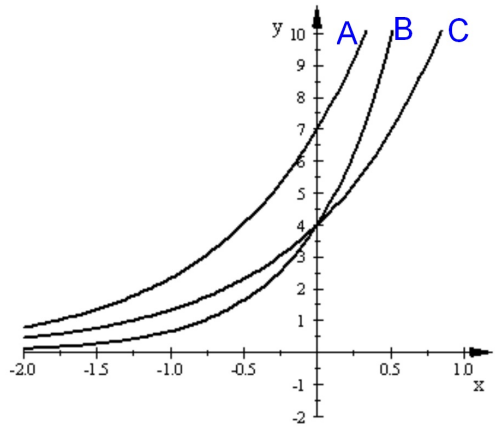
a: The value of a

- determines the y-intercept of the graph
- If a<0 the graph is upside down. (x-axis Reflection)

b: The value of b

- 0<b<1 then graph is exponential decay
- b>1 then graph is exponential growth

1. $y = 4(3)^x$ C 2. $y = 7(3)^x$ A 3. $y = 4(6)^x$ B



Make a sketch of the graph of the following equations on the same set of axes. Label the graphs with the appropriate letter. Don't use a graphing calculator.

A. $y = 4(8)^x$

B. $y = 4(3)^x$

C. $y = 2(0.3)^x$

D. $y = 6(3)^x$

E. $y = 2(0.75)^x$

A. $y = 4(8)^x$ B. $y = 4(3)^x$ C. $y = 2(0.3)^x$

D. $y = 6(3)^x$ E. $y = 2(0.75)^x$