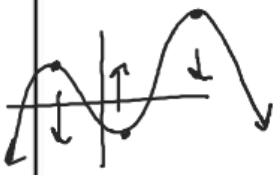
$y = ab^x$

( ) → Not included

[ ] → Included

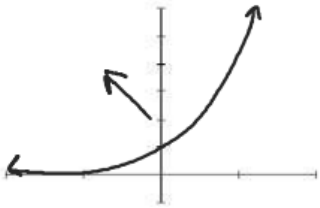
even- symetric about Y-axis

odd- Symetric about origin



Sketch a graph of the following functions in the same viewing window [-2, 2] [-1, 6]

$y_1 = 2^x$ $y_2 = 3^x$ $y_3 = 4^x$ $y_4 = 5^x$



1) Determine the domain and range

D: $(-\infty, \infty)$

R: $(0, \infty)$

2) Is the function even, odd or neither

Neither

3) Intervals of Increase or Decrease

Inc $(-\infty, \infty)$

4) Find any extrema.

None

5) Determine the end behavior

$\lim_{x \to -\infty} f(x) = 0$ $\lim_{x \to \infty} f(x) = \infty$

6) Find any asymptotes

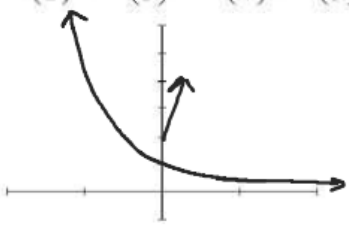
V.A. None

H.A. $y = 0$

7) Intervals of Concavity

Concave up $(-\infty, \infty)$

$y = \left(\frac{1}{2}\right)^x$ $y = \left(\frac{1}{3}\right)^x$ $y = \left(\frac{1}{4}\right)^x$ $y = \left(\frac{1}{5}\right)^x$



1) Determine the domain and range

D: $(-\infty, \infty)$

R: $(0, \infty)$

2) Is the function even, odd or neither

3) Intervals of Increase or Decrease

Dec $(-\infty, \infty)$

4) Find any extrema.

None

5) Determine the end behavior

$\lim_{x \to -\infty} f(x) = \infty$ $\lim_{x \to \infty} f(x) = 0$

6) Find any asymptotes

V.A = None

H.A. $y = 0$

7) Intervals of Concavity

Concave up $(-\infty, \infty)$

Describe how to transform the graph of $\mathbf{f(x) = 2^x}$ into the graph of g

a) $g(x) = 2^{x-1}$

Shift Right 1

b) $g(x) = 2^{-x}$

Reflection over y-axis

$\boxed{2^{-x+3}}$

c) $g(x) = 3 \cdot 2^x$

Vertical Stretch by a factor of 3

d) $g(x) = 2^{3-x}$

$2^{-(x-3)}$

Describe how to transform the graph of $\mathbf{f(x) = e^x}$ into the graph of g

$y = e^{\frac{1}{2}x}$

a) $g(x) = e^{4x}$

Horizontal Compression by a factor of $\frac{1}{4}$

b) $g(x) = e^{-4x}$

Reflection over y-axis Horizontal Compression by a factor of $\frac{1}{4}$

c) $g(x) = 3 \cdot e^x + 1$

Vertical Stretch by factor of 3

Shift up 1

d) $g(x) = e^{2-2x}$

e^{-2x+2}

$e^{-(2x-2)}$

$e^{-2(x-1)}$

Reflect over y-axis

Horizontal Compress by Factor $\frac{1}{2}$

Shift Right 1

$b > 1$

Exp growth

$0 < b < 1$

Exp decay

State whether the function is exponential growth or decay and describe its end behavior

Decay

A) $f(x) = 2^{3x}$ B) $f(x) = 2^{-3x}$ C) $f(x) = \left(\frac{1}{4}\right)^x$ D) $f(x) = \left(\frac{1}{4}\right)^{-x}$

Growth

$\lim_{x \to \infty} f(x) = \infty$

$\lim_{x \to -\infty} f(x) = 0$

$\frac{1}{2^{3x}}$

$\lim_{x \to \infty} f(x) = 0$

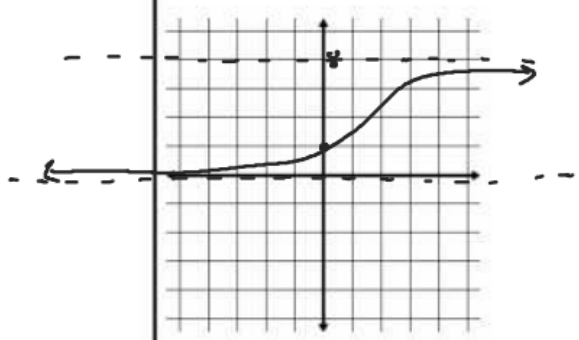
$\lim_{x \to -\infty} f(x) = \infty$

$= 4^x$

Logistical Growth

Graph the following functions on your calculator. Find the y-intercept and the horizontal asymptotes

$f(x) = \frac{8}{1 + 3 \cdot 0.7^x}$ → max



$f(x) = \frac{20}{1 + 2 \cdot e^{-3x}}$