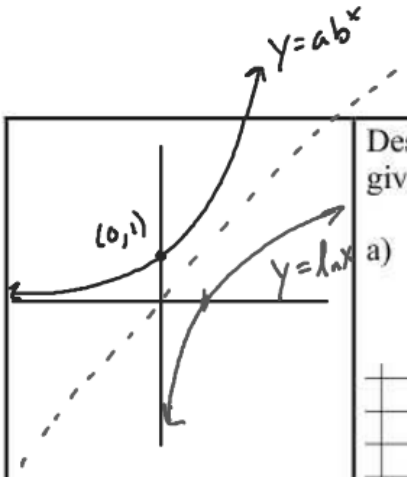
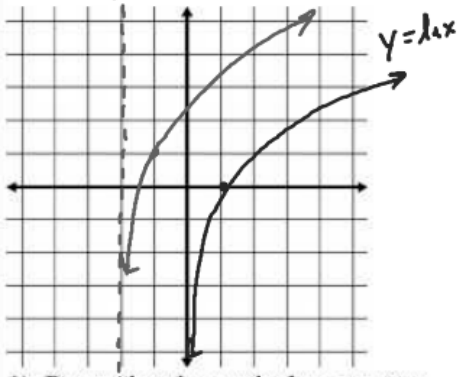


Describe how to transform the graph of y = ln x into the graph of the given function. Sketch the graph by hand.

a) $g(x) = \ln(x+2)+1$

Left 2
up 1



1) Determine the vertical asymptotes

$X = -2$

2) Determine the x-intercept

X

3) Determine the domain and range

$D: (-2, \infty)$

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

4) Intervals of Increase or Decrease

Inc $(-2, \infty)$

5) Determine the end behavior

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

$\lim_{x \to -2} f(x) = -\infty$

6) Intervals of Concavity

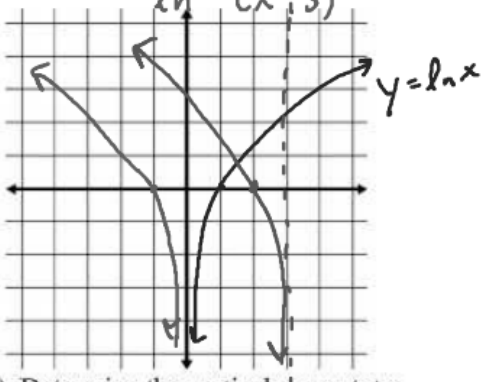
Down $(-2, \infty)$

b) $h(x) = \ln(3-x)$

Reflection over y-axis
Right 3

$\ln(-x+3)$

$\ln -(x-3)$



1) Determine the vertical asymptotes

$X = 3$

2) Determine the x-intercept

$X = 2$

3) Determine the domain and range

$D: (-\infty, 3)$

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

4) Intervals of Increase or Decrease

Dec $(-\infty, 3)$

5) Determine the end behavior

$\lim_{x \to 3} f(x) = -\infty$

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

6) Intervals of Concavity

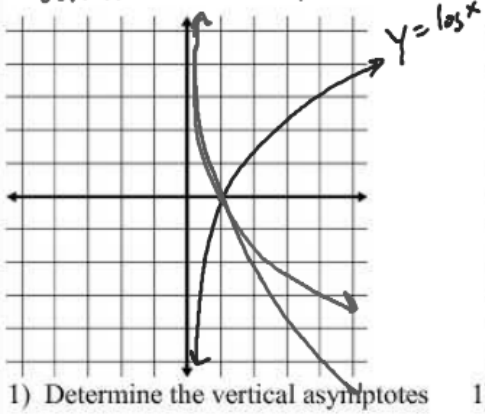
Down $(-\infty, 3)$

Describe how to transform the graph of y = ln x into the graph of the given function. Sketch the graph by hand.

a) $g(x) = -3\log x$

Reflect over x-axis

Vertical Stretch by factor of 3



1) Determine the vertical asymptotes

$X = 0$

2) Determine the x-intercept

$X = 1$

3) Determine the domain and range

D: $(0, \infty)$

R $(-\infty, \infty)$

4) Intervals of Increase or Decrease

Dec $(0, \infty)$

5) Determine the end behavior

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

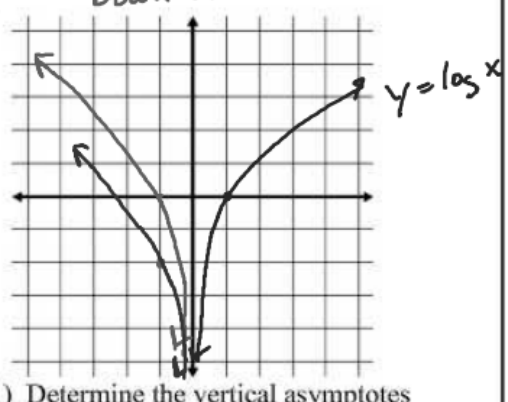
6) Intervals of Concavity

Up $(0, \infty)$

b) $h(x) = \log(-x) - 2$

Reflect over y-axis

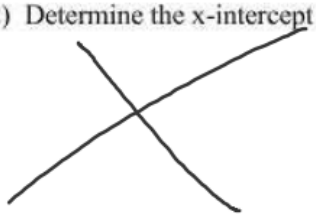
Down 2



1) Determine the vertical asymptotes

$X = 0$

2) Determine the x-intercept



3) Determine the domain and range

D: $(-\infty, 0)$

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

4) Intervals of Increase or Decrease

D: $(-\infty, 0)$

5) Determine the end behavior

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

6) Intervals of Concavity

Down $(-\infty, 0)$

What you'll Learn About

Use your Calculator to Determine which of the following are True.

1. $\log(5+2) = \log 5 + \log 2$
2. $\log(5\cdot 2) = \log 5 + \log 2$
3. $\log(5-2) = \log 5 - \log 2$
4. $\log\left(\frac{5}{2}\right) = \log 5 - \log 2$
5. $\log(5\cdot 2) = 2\log 5$
6. $\log\left(\frac{5}{2}\right) = \frac{\log 5}{\log 2}$
7. $\log(5^2) = \log 5 \cdot \log 5$
8. $\log(5^2) = 2\log 5$
9. $\ln(x+2) = \ln x + \ln 2$
10. $\log(7x) = 7\log x$
11. $\log(5x) = \log 5 + \log x$
12. $\ln\left(\frac{x}{5}\right) = \ln x - \ln 5$
13. $\log\left(\frac{x}{4}\right) = \frac{\log x}{\log 4}$
14. $\log_4 x^3 = 3\log_4 x$
15. $\ln(x^2) = \ln x \cdot \ln x$
16. $\log|4x| = \log 4 + \log|x|$

Let b , R, and S are positive real numbers with $b \neq 1$, and c any real number

- $\log_b(RS) = \log_b R + \log_b S$
- $\log_b\left(\frac{R}{S}\right) = \log_b R - \log_b S$
- $\log_b R^c = c \log_b R$

Prove the Product Rule for Logarithms: $\log_b(RS) = \log_b R + \log_b S$

Let $x = \log_b R$ and $y = \log_b S$

Assuming x and y are positive, use properties of logarithms to write the expression as a **sum or difference** of logarithms or multiples of logarithms

A) $\log(8x)$

$\log 8 + \log x$

B) $\ln\left(\frac{5}{x}\right)$

$\ln 5 - \ln x$

C) $\log_2(x^5) = 5\log_2 x$

D) $\log(8x^2y^4)$

$\log 8 + \log x^2 + \log y^4$

$\log 8 + 2\log x + 4\log y$

E) $\ln\left(\frac{\sqrt{x^2+5}}{\sqrt[3]{x^4}}\right)$

$\ln\sqrt{x^2+5} - \ln\sqrt[3]{x^4}$

$\ln(x^2+5)^{1/2} - \ln x^{4/3}$

$\frac{1}{2}\ln(x^2+5) - \frac{4}{3}\ln x$