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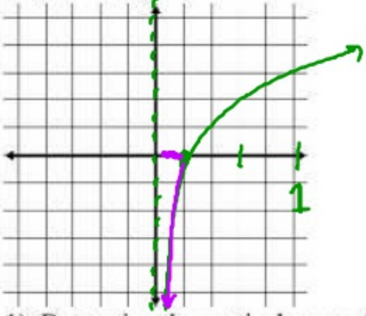
Sketch a graph of the following functions

$f(x) = \log_3(5x)$



1) Determine the vertical asymptotes

$x = 0$

2) Determine the x-intercept

$0 = \log_3(5x)$

$3^0 = 5x$

$\frac{1}{5} = \frac{5x}{5}$

$\frac{1}{5} = x$

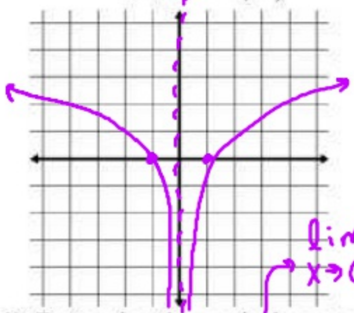
3) Determine the domain and range

4) Intervals of Increase or Decrease

5) Determine the end behavior

6) Intervals of Concavity

$f(x) = \ln(x^4)$



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

1) Determine the vertical asymptotes

$x = 0$

2) Determine the x-intercept

$0 = \ln_e x^4$

$e^0 = x^4$

$\sqrt[4]{1} = \sqrt[4]{x^4}$

$\pm 1 = x$

3) Determine the domain and range

4) Intervals of Increase or Decrease

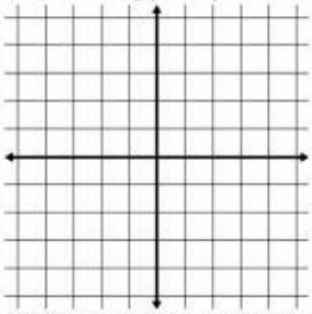
5) Determine the end behavior

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

6) Intervals of Concavity

Sketch a graph of the following functions

$f(x) = \log_3(x-4)$



1) Determine the vertical asymptotes

2) Determine the x-intercept

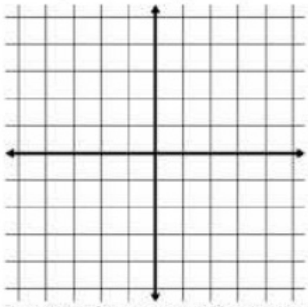
3) Determine the domain and range

4) Intervals of Increase or Decrease

5) Determine the end behavior

6) Intervals of Concavity

$f(x) = \ln(4-x)$



1) Determine the vertical asymptotes

2) Determine the x-intercept

3) Determine the domain and range

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What you'll Learn About

Find the exact solution algebraically, and check it by substituting into the original equation.

A) $\left(\frac{1}{4}\right)^x = \frac{1}{16}$

$x = 2$

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

$x = 2$

B) $\frac{20\left(\frac{1}{2}\right)^{x/3}}{20} = \frac{5}{20}$

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

$\left(\frac{1}{2}\right)^{x/3} = \left(\frac{1}{2}\right)^2$ $(3)\frac{x}{3} = 2(3)$

$x = 6$

C) $\frac{2(3)^{x/2}}{2} = \frac{6}{2}$

$3^{x/2} = 3^1$

$(2)\ \frac{x}{2} = 1(2)$

$x = 2$

D) $\frac{2(3)^{-x/2}}{2} = \frac{54}{2}$

$3^{-x/2} = 27$

$3^{-x/2} = 3^3$ $(-2)\ -\frac{x}{2} = 3(-2)$

$x = -6$

E) $\log x = 5$

$\log_{10} x = 5$

$10^5 = x$

$100000 = x$

F) $\log_2(x-4) = 3$

$\log_2(x-4) = 3$

$2^3 = x - 4$

$8 = x - 4$

$12 = x$

$2.03^x = 5$

$\log_{2.03} 2.03^x = \log_{2.03} 5$

$x = \log_{2.03} 5$

Solve each equation algebraically

A) $2.03^x = 5$

$2.03^x = 5$

$\log 2.03^x = \log 5$

$\frac{x \log 2.03}{\log 2.03} = \frac{\log 5}{\log 2.03}$

$x = \frac{\log 5}{\log 2.03}$

$2.03^x = 5$

$\ln 2.03^x = \ln 5$

$\frac{x \ln 2.03}{\ln 2.03} = \frac{\ln 5}{\ln 2.03}$

$x = \frac{\ln 5}{\ln 2.03}$

B) $\frac{50(e)^{0.03x}}{50} = \frac{500}{50}$

$e^{.03x} = 10$

$\ln_e e^{.03x} = \ln 10$

$.03x = \ln 10$

$x = \frac{\ln 10}{.03}$

C) $2\ln(x+3) + 6 = 10$

$-6 \quad -6$

$\frac{2\ln(x+3)}{2} = \frac{4}{2}$

$\ln_e(x+3) = 2$

$e^2 = x+3$

$e^2 - 3 = x$

$e^{\ln(x+3)} = e^2$

$x + 3 = e^2$

D) $2 - \log(x+3) = 10$

$-2 \quad -2$

$(-1) \quad -\log(x+3) = 8 \quad (-1)$

$\log_{10}(x+3) = -8$

$10^{-8} = x + 3$

$\frac{1}{100000000} - 3 = x$