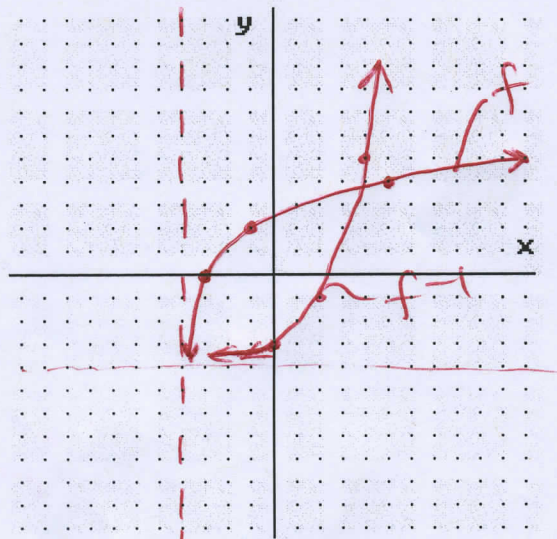


Name: KEY

Read all directions and problems carefully! Show all appropriate work for credit.

1. For the function $f(x) = 2\log_3(x+4)$, a) Graph $f(x)$ b) identify its Domain, Range, and the Vertical Asymptote c) label at least three points d) graph $f^{-1}(x)$ on the same set of axes.



b) $D: (-4, \infty)$

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

VA: $x = -4$

c) $(-3, 0); (-1, 2); (5, 4)$

(+3)

2. Simplify the following expressions

$\ln(x^2 + 4) - 3\ln(x - 2) = \ln(x^2 + 4) - \ln(x - 2)^3$

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

$\log_4 \frac{1}{64}$

$\log_4 4^{-3} = -3$ (+1)

$e^{-\ln x + \ln x^3} = e^{\ln x^{-1}} \cdot e^{\ln x^3} = x^{-1} \cdot x^3 = x^2$

$= x^2$ (+1)

$10^{\log_3 \sqrt{3}}$

$10^{\log_3 3^{\frac{1}{2}}} = 3^{\frac{1}{2}} = \sqrt{3}$ (+1)

3. Find the derivative for the following functions.

$y = x \ln x^2$ (Prod. Rule)

$\frac{dy}{dx} = 1 \cdot \ln x^2 + x \cdot \frac{1}{x^2} (2x)$

$= \ln(x^2) + 2$ (+2)

$y = \ln \frac{(x-1)^2}{\sqrt{x+1}} = 2\ln(x-1) - \frac{1}{2}\ln(x+1)$

$\frac{dy}{dx} = 2 \frac{1}{x-1} - \frac{1}{2} \frac{1}{x+1} = \frac{2}{x-1} - \frac{1}{2(x+1)}$ (+2)

$y = e^{-4x+5x^3}$

$\frac{dy}{dx} = e^{-4x+5x^3} (-4+15x^2)$ (+2)

$y = 7^{\cos x} + \log_3 \sqrt{x^4 - 9} = 7^{\cos x} + \frac{1}{2} \log_3(x^4 - 9)$

$\frac{dy}{dx} = 7^{\cos x} (\ln 7)(-\sin x) + \frac{1}{2} \frac{1}{x^4 - 9} \frac{1}{\ln 3} (4x^3)$

$= -7^{\cos x} (\ln 7) \sin x + \frac{2x^3}{(x^4 - 9) \ln 3}$ (+2)

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