

Quiz #11 SOLUTIONS

Answer all questions and show all your work. Only the Sharp EL531 calculator is permitted.

Question 1 (6 points)

Sketch the graph of the following function. State the domain, range, intercepts and asymptotes.

a) $f(x) = 3^{x+1} - 9$

Domain: \mathbb{R}

Range: $(-9, \infty)$

x-int: $3^{x+1} - 9 = 0$

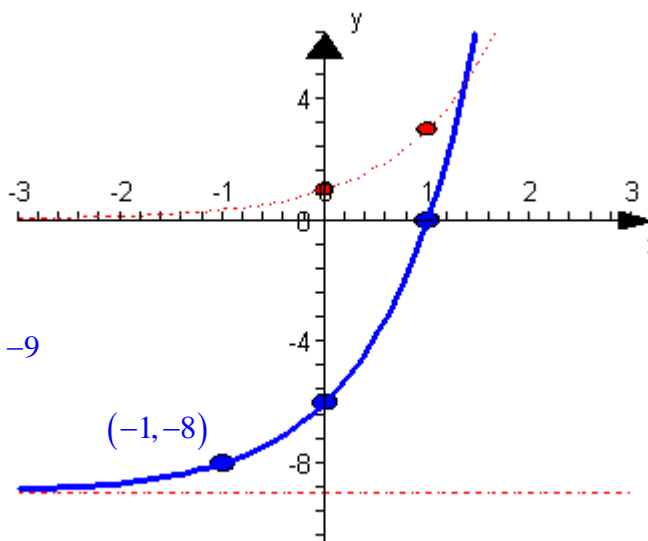
$$3^{x+1} = 3^2$$

$$x+1 = 2$$

$$x = 1$$

y-int: $f(0) = 3^1 - 9 = -6$

Horizontal Asymptote: $y = -9$



b) $f(x) = -\ln(x+2) + 1$

Domain: $(-2, \infty)$

Range: \mathbb{R}

x-int: $-\ln(x+2) + 1 = 0$

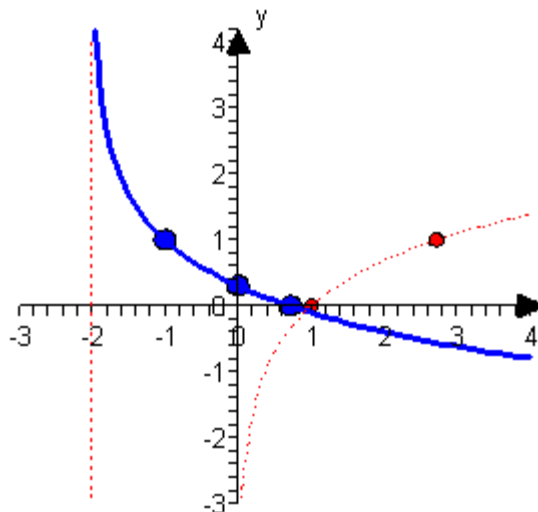
$$1 = \ln(x+2)$$

$$x+2 = e^1$$

$$x = e - 2$$

y-int: $f(0) = -\ln 2 + 1$

Vertical Asymptote: $x = -2$



Question 2 (2 points)

Rewrite the given expression in a form with no logarithms of products, quotients, or powers.

$$\begin{aligned}\log_4 \frac{16x^3}{y^2\sqrt{z}} &= \log_4 16 + \log_4 x^3 - \log_4 y^2 - \log_4 \sqrt{z} \\ &= \log_4 4^2 + \log_4 x^3 - \log_4 y^2 - \log_4 z^{\frac{1}{2}} \\ &= 2 + 3\log_4 x - 2\log_4 y - \frac{1}{2}\log_4 z\end{aligned}$$

Question 3 (2 points)

Rewrite the expression as a single logarithm.

$$\begin{aligned}3\log_2 x^2 - 6\log_2 (x^2 + 1) + \log_2 5 - 3\log_2 \sqrt{x} &= \log_2 x^6 - \log_2 (x^2 + 1)^6 + \log_2 5 - \log_2 x^{\frac{3}{2}} \\ &= \log_2 \frac{5x^6}{x^{\frac{3}{2}}(x^2 + 1)^6} \\ &= \log_2 \frac{5x^{\frac{9}{2}}}{(x^2 + 1)^6}\end{aligned}$$