

4.4 - HW Solutions 49, 61, 101 - 109 odd

49.) $f(x) = 3 - 2 \log_4 \left(\frac{x}{2} \right)$

① $\left(\frac{x}{2} \right)$ must be greater than zero, so solve the following inequality:

$$\frac{x}{2} > 0$$

$$2 \cdot \frac{x}{2} > 0 \cdot 2 \rightarrow x > 0$$

$$\text{Domain: } \{x \mid x > 0\}$$

61.) Find a such that the graph of $f(x) = \log_a x$ contains the point $(2, 2)$.

① sub in the point $(2, 2)$ for x & y , rewrite as an exponential function, then solve.

$$2 = \log_a 2 \Rightarrow a^2 = 2 \Rightarrow \boxed{a = \sqrt{2}}$$

* can't be $-\sqrt{2}$ b/c
 $a > 0$

101. $\log_3 243 = 2x + 1$

\downarrow
 $3^y = 243$

$y = 5$

$\rightarrow 5 = 2x + 1$

$\frac{4}{2} = \frac{2x}{2} \rightarrow \boxed{x = 2}$

<over>

$$103. e^{3x} = 10$$

① take \ln of each side

$$\ln e^{3x} = \ln 10$$

$$\frac{3x}{3} = \frac{\ln 10}{3} \rightarrow \boxed{x = \frac{\ln 10}{3}}$$

$$105.) e^{2x+5} = 8$$

$$\ln e^{2x+5} = \ln 8 \rightarrow 2x+5 = \ln 8$$

$$\frac{2x}{2} = \frac{\ln 8 - 5}{2} \rightarrow \boxed{x = \frac{\ln 8 - 5}{2}}$$

$$107.) \log_3(x^2+1) = 2$$

① rewrite as an exponential function

$$3^2 = x^2 + 1 \rightarrow 9 = x^2 + 1$$

$$8 = x^2 \rightarrow \boxed{x = \pm 2\sqrt{2}}$$

$$109.) \log_2 8^x = -3$$

$$2^{-3} = 8^x \rightarrow 2^{-3} = (2^3)^x$$

$$-3 = 3x \rightarrow \boxed{x = -1}$$