

3. [13 points] Solve the following equations for the indicated variable. Your answers should be given in **exact** form. Show carefully **all** your work.

a. [4 points]  $\log(x^5) = \pi$ . Solve for  $x$ .

*Solution:*

$$\begin{aligned}\log(x^5) &= \pi \\ x^5 &= 10^\pi \\ x &= \sqrt[5]{10^\pi}\end{aligned}$$

b. [4 points]  $(\ln(w + 4))^3 = e$ . Solve for  $w$ .

*Solution:*

$$\begin{aligned}(\ln(w + 4))^3 &= e \\ \ln(w + 4) &= e^{1/3} \\ w + 4 &= e^{(e^{1/3})} \\ w &= e^{(e^{1/3})} - 4\end{aligned}$$

c. [5 points]  $e^{-2p+7} = 10 \cdot 3^p$ . Solve for  $p$ .

*Solution:*

$$\begin{aligned}e^{-2p+7} &= 10 \cdot 3^p \\ \ln(e^{-2p+7}) &= \ln(10 \cdot 3^p) \\ (-2p + 7) \ln(e) &= \ln(10) + \ln(3^p) \\ -2p + 7 &= \ln(10) + p \ln(3) \\ p(\ln(3) + 2) &= 7 - \ln(10) \\ p &= \frac{7 - \ln(10)}{\ln(3) + 2}\end{aligned}$$