1. [5 points] For each of the statements below, circle “True” if the statement is definitely true. Otherwise, circle “False”. You do not need to show any work for this problem.

a. [1 point] If a function has more than one zero, then the function is not invertible.
   True  False

b. [1 point] If $x > 1$, then $100x^{100000} > e^{0.0001x}$.
   True  False

c. [1 point] If $h(t) = \ln(t)$ then $h^{-1}(t) = \frac{1}{\ln(t)}$.
   True  False

d. [1 point] If a function is concave up, then the function is increasing.
   True  False

e. [1 point] If $f(x)$ and $g(x)$ are both even functions, then the function $f(g(x))$ is also an even function.
   True  False

2. [6 points] Solve each of the equations below. Show your work step-by-step and write the solutions in exact form in the answer blanks provided.

a. [3 points] $5e^{2t+7} = 3(4^t)$
   
   Solution: We first divide both sides of this equation by 5 to find $e^{2t+7} = 0.6(4^t)$. Then we use logarithms to find $t$.
   
   $\ln(e^{2t+7}) = \ln(0.6(4^t))$
   $2t + 7 = \ln(0.6) + \ln(4^t) = \ln(0.6) + t \ln(4)$
   $2t - t \ln(4) = \ln(0.6) - 7$
   $t(2 - \ln(4)) = \ln(0.6) - 7$ so $t = \frac{\ln(0.6) - 7}{2 - \ln(4)}$

   Answer: $t = \frac{\ln(0.6) - 7}{2 - \ln(4)}$

b. [3 points] $\log(w) + \log(w + 3) = 1$
   
   Solution: We apply a basic property of logarithms and then use the definition or the logarithm (or exponentiate) to solve for $w$.
   
   $\log(w) + \log(w + 3) = 1$
   $\log(w(w + 3)) = 1$
   $w(w + 3) = 10^1$
   $w^2 + 3w = 10$
   $w^2 + 3w - 10 = 0$
   $(w - 5)(w + 2) = 0$
   $w = 5$ or $w = -2$

   However, note that $w = -2$ is not a solution to the original equation because $-2$ is not in the domain of $\log w$. Hence the only solution is $w = 5$.

   Answer: $w = 5$