First and last name:___________________________

Open book.

1. [5 points ] Find the exact value of the logarithm without using a calculator:
   (a) \( \log_5 100 - \log_5 4. \)

   **Solution:**
   
   \[
   \log_5 100 - \log_5 4 = \log_5 (100/4) = \log_5 (25) = 2. \]

   1 point

   (b) \( \ln\sqrt{e^3} \)

   **Solution:**
   
   \[
   \ln\sqrt{e^3} = \ln e^{3/2} = 3/2 \]

   2 points

2. [5 points ]

   (a) Solve the equation algebraically
   
   \( 8 - 4^x = 5. \)

   **Solution:**
   
   \[
   8 - 4^x = 5 \implies 4^x = 3 \implies x = \log_4 3. \]

   1 point

   2 points

   (b) Write your answer to 2(a) to three decimal places (if you don’t have a calculator, write your answer in terms of \( \log_{10} \)).

   \[
   x = \log_4 3 = \frac{\log_{10} 3}{\log_{10} 4}. \]

   2 points