5. [10 points] Let \( t \) be the number of minutes a student waits for the Bursley-Baits bus. For constants \( a \) and \( b \), the probability density function giving the distribution of \( t \) is

\[
p(t) = \begin{cases} 
0 & \text{if } t < 0 \\
ae^{-bt} & \text{if } 0 \leq t < \infty.
\end{cases}
\]

According to this density function, the mean waiting time for the bus is 8 minutes.

a. [6 points] Determine the exact values of the constants \( a \) and \( b \). Answers supported only by calculator work will not receive full credit. Write your final answers on the spaces provided.

\[
a = \quad \text{and} \quad b = \quad \text{.}
\]

b. [4 points] Using your answers from part (a), determine the exact value for median waiting time. Include units in your answer. Answers supported only by calculator work will not receive full credit.