Problem 1

1. Rewrite $a^x$ such that the base is in terms of $e$. (i.e. write it as $e^{f(x)}$ for some function $f$).

2. Differentiate this expression to show that the derivative of $a^x$ is $\ln a \cdot a^x$. 
Problem 2

1. Fill in the blank \( \tan(\tan^{-1}(x)) = \cdot \).

2. Find the derivative of \( \tan^{-1}(x) \).

3. Using the chain rule, find the derivative of \( \tan^{-1}(xe^x) \).