9. [11 points] In the following problems show all your work to receive full credit.

a. [7 points] The population of an invasive aquatic plant in a circular lagoon has density given by \( \delta(r) = 20(1 - e^{-r^2}) \) kg/m\(^2\), where \( r \) is the distance in meters from its center. The lagoon has radius \( R \) meters. Find the exact amount of plants living at the lake.

b. [4 points] Let

\[
F(x) = \int_0^x \sqrt{e^{2t} - 1} \, dt.
\]

Find the exact value of the length of the curve on \( 0 \leq x \leq 1 \).