1. [8 points] Radioactive waste has been draining into a lake, causing trees in the surrounding forest to wilt and die. On March 24, 2010, local scientists surveyed the surrounding forest, determining that $S(m)$ thousand trees had begun to wilt $m$ kilometers out from the center of the lake. The scientists determined that 20 thousand trees were decaying 20 kilometers out, and 5 thousand trees were decaying 60 kilometers out.

   a. [3 points] Assume that the function $S$ is invertible. Find the average rate of change of the inverse function $S^{-1}$ on the interval $[5, 20]$. Write your final answer in the space provided, and include units.

   The average rate of change of $S^{-1}$ on the interval $[5, 20]$ is ________________

   b. [5 points] Find a formula for $S(m)$ in terms of $m$, assuming that $S$ is a power function of $m$. Your answer should be exact, and you must show your work carefully, writing your final answer in the space provided.

   $S(m) = ________________________________