1. (Lial, Greenwell & Ritchey) The value of a particular investment changes over time according to the function \( S(t) = 5000 \ e^{0.1(0.25t)} \), where \( S(t) \) is the value of \( t \) years. Calculate the rate at which the value of the investment is changing after 8 years.

2. (Lial, Greenwell & Ritchey) A study of the relation between the rate of reproduction in fruit flies bred in bottles and the density of the mated population found that the number of imagoes (sexually mature adults) per mated female per day \((y)\) can be approximated by \( \log y = 1.54 – 0.008x – 0.658 \log x \), where \( x \) is the mean density of the mated population over a 16-day period. Find the rate of change in the number of imagoes per mated female per day with respect to density when the density is 40 flies per bottle.