Problem # 2 (20) There are N chips on a circuit board. The lifetime of a chip in years is an exponential random variable:

$$f_T(t) = \begin{cases} \lambda e^{-\lambda t} & t \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

where $\lambda > 0$. The chips fail independently of each other.

a) What is the probability that the lifetime of a chip is less than a year?

b) The board is designed such that it can operate as long as at least two of the N chips have not failed. What is the probability that the board will fail within less than K years?