Suppose that the lifetime of an electronic chip follows an exponential distribution with unknown $\lambda$. A total of $M+N$ chips are tested in two independent experiments. In the first experiment with $N$ chips, the exact life times of the chips are recorded as $y_1, y_2, \ldots, y_N$. In the second experiment, suppose that the experimenter enters the laboratory at some time $t > 0$. The experimenter sees that some of the $M$ chips are not working at time $t$, and some others are still working. The available data from the second experiment are binary indicators $E_1, E_2, \ldots, E_M$, where $E_M=0$ if the chip is not working at time $t$ and $E_M=1$ if the chip is working at time $t$. Using Expectation Maximization find a maximum likelihood estimate for $\lambda$.

Derive the Expectation and Maximization equations for this problem generally. Use the derived equations to run EM for the following real dataset:

$M = 10$
$N = 6$
$t = 16$

$(y_1, y_2, \ldots, y_N) = (12, 22, 18, 14, 15, 20)$
$(E_1, E_2, \ldots, E_M) = (1, 0, 0, 1, 0, 0, 0, 1, 0, 0)$

You may use R, C, or even MS Excel to solve the second part. So, any source code in any language will be accepted.

Deliverables:
Your written general solution.
Your R, C or Excel code.
Your estimation value for the $\lambda$ for the specific dataset.