2. (a) (4 points) The temperature $T_R$ of a certain nuclear reactor is decaying exponentially in time toward a background temperature $T_B = 25^\circ C$: $T_R = T_B + ae^{-t}$ where $t$ is measured in hours and $a$ is a constant. The temperature $T$ of a container of water placed in the reactor is subject to Newton’s Law of Cooling/Heating: the time rate of change of the temperature $T$ is proportional to the difference between $T$ and the reactor temperature. If at time $t = 0$,
- The reactor temperature is at 325$^\circ$ C,
- The water temperature is the same as the background temperature, and
- The water temperature is increasing by 600$^\circ$ C per hour,
find (but do not solve) the precise first-order ODE satisfied by the water temperature $T(t)$.

(b) (4 points) The number $F(t)$ of fish in a small lake $t$ weeks after the beginning of summer is governed by the differential equation $F' = -4F + S(t)$, where $S(t)$ (fish/week) is the rate at which the lake is stocked with fish by the park ranger. The park ranger starts out putting in 1000 fish/week but gets busy with other things and ends up adding fewer fish every week so that $S(t) = 1000e^{-2t}$. If there aren’t any fish in the lake at the beginning of summer, find $F(t)$. 