How to cooling a beer in refrigerator

$A := .05^2\pi \cdot 2 + .05 \cdot \pi \cdot 2 \cdot .25$ The area on beer

$cp := 4225$ Specific captivity in the beer

$\alpha := 5.8$ Convection constant

$m := 0.5$ Mass of the beer

$k := \frac{\alpha \cdot A \cdot 3600}{cp \cdot m}$ Calculation a constant 3600 gives the time in hours

$T0 := 20$ Temperature of the beer

$Tmin := 3$ Temperature of the refrigerator

Four equations who I states the cooling formula ekv(4). If you differentiate the temp T1 with respect to time, you get the cooling effect you put into the beer, set eqv (2) = eqv (3) . And you got eqv (4). This principle I believe you can attach on radiation too.

(1) $\Delta Q = m \cdot cp \cdot \Delta T$

(2) $P = m \cdot cp \cdot \frac{\Delta T1}{\Delta t}$

(3) $P = \alpha \cdot A \cdot (T2 - T1)$

(4) $T1' = \frac{\alpha \cdot A}{m \cdot cp} \cdot (T2 - T1)$

Given

$\frac{d}{dt} T(t) = k \cdot (Tmin - T(t))$ The differential equation, a linjear diff of first order..

$T(0) = T0$ The initial temp of the beer

$T := Odesolve(t, 4)$ Solves the equation about 4 hours