(iii) at $t=\infty$, $e^{kt}=e^{\infty}=\infty$

$e^{-kt}=\frac{1}{\infty}=0$, by (5) $T=T_0$

By Eq (5) we get that the temperature of the body decreases exponentially and finally it achieves the temp of the surrounding (T_0).

Example: A pan filled with hot food cools from 94 °C to 86 °C in 2 minutes when the room temperature is at 20 °C. How long will it take to cool from 71 °C to 69 °C?

$T_1 = 94°C \longrightarrow T_2 = 86°C$, $dt = 2\text{min} = 120\text{sec}$

$T_0 = 20°C$

$$\frac{dT}{dt} = -k(T-T_0)$$

$dT = 86-94 = -8°C$

$dt = 120\text{sec}$

$T = \frac{T_1+T_2}{2} = \frac{94+86}{2} = 90°C$