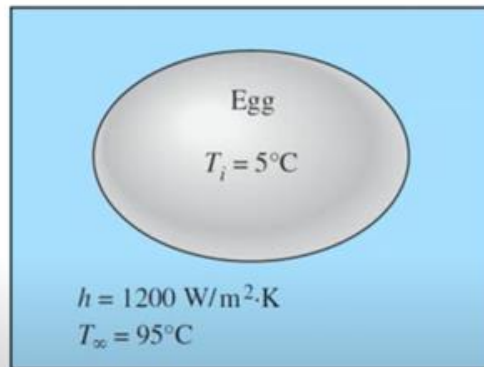


## Transient Heat Transfer Demonstration Problem



$r = 2.5 \text{ cm}$   
 $k = 0.627 \text{ W/m}\cdot\text{K}$   
 $\rho = 993.05 \text{ kg/m}^3$   
 $c_p = 4178.5 \text{ J/kg}\cdot\text{K}$   
 $T_i = 5^\circ\text{C}$   
 $h = 1200 \text{ W/m}^2\cdot\text{K}$

The time at which the center of the egg reaches  $70^\circ\text{C}$ ?

A screenshot of a table from a software interface, likely COMSOL, showing the time at which the center of the egg reaches  $70^\circ\text{C}$ . The table has two columns: "Time (s)" and "Temperature (degC)". The row where the temperature is  $70.042$  is highlighted, and a mouse cursor is pointing at the time value  $860.00$ .

Time (s)	Temperature (degC)
845.00	69.135
850.00	69.441
855.00	69.743
860.00	70.042
865.00	70.336
870.00	70.627
875.00	70.913
880.00	71.196

Reference: COMSOL Conduction heat transfer - Boiling Eggs,  
<https://www.youtube.com/watch?v=HZtdfpbAz9E>

# Abaqus Solution

## (axisymmetric transient heat transfer)

Abaqus Consistent Units

Quantity	SI	SI (mm)	US Unit (ft)	US Unit (inch)
Length	m	mm	ft	in
Force	N	N	lbf	lbf
Mass	kg	tonne ( $10^3$ kg)	slug	lbf s <sup>2</sup> /in
Time	s	s	s	s
Stress	Pa (N/m <sup>2</sup> )	MPa (N/mm <sup>2</sup> )	lbf/ft <sup>2</sup>	psi (lbf/in <sup>2</sup> )
Energy	J	mJ ( $10^{-3}$ J)	ft lbf	in lbf
Density	kg/m <sup>3</sup>	tonne/mm <sup>3</sup>	slug/ft <sup>3</sup>	lbf s <sup>2</sup> /in <sup>4</sup>

Abaqus temperature distribution at time = 862 seconds

