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### 3.1.1 Finger Exercise: Coffee temperature rate of change

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Finger Exercises 1 due Aug 3, 2023 05:00 IST   Completed

Problem: Calculate temperature rate of change for a hot and cold day

0/2 points (graded)

M02.4

Consider a cup of coffee for which following values apply:

$$m_c = 0.35 \text{ kg}, \quad c_c = 4200 \text{ J/(kgC)}, \tag{3.1}$$

$$h = 5 \text{ W/(m}^2\text{C)}, \quad A = 0.04 \text{ m}^2 \tag{3.2}$$

Consider first a warm day in which the outside temperature is  $T_{\text{out}} = 25^\circ\text{C}$ . If the temperature of the coffee at some instant in time is  $T_c = 40^\circ\text{C}$ , what is the rate of change of the coffee temperature (i.e.  $\text{d}T_c/\text{d}t$ ) in units of  $\text{C/s}$ ? Provide your answer with three digits of precision (of the form X.YZeP where P is the base10 power).

-0.002

✗ Answer: -2.040816326530612E-3

Now consider a cool day in which the outside temperature is  $T_{\text{out}} = 5^\circ\text{C}$ . If the temperature of the coffee is  $T_c = 40^\circ\text{C}$ , what is the rate of change of the coffee temperature (i.e.  $\text{d}T_c/\text{d}t$ ) in units of  $\text{C/s}$ ? Provide your answer with three digits of precision (of the form X.YZeP where P is the base10 power).

-0.005

✗ Answer: -4.7619047619047615E-3

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**i** Answers are displayed within the problem

**SOLUTION:** The solution will be available shortly after the due date in Section [3.2.1](#).

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