MCEN 3022 - Homework 2

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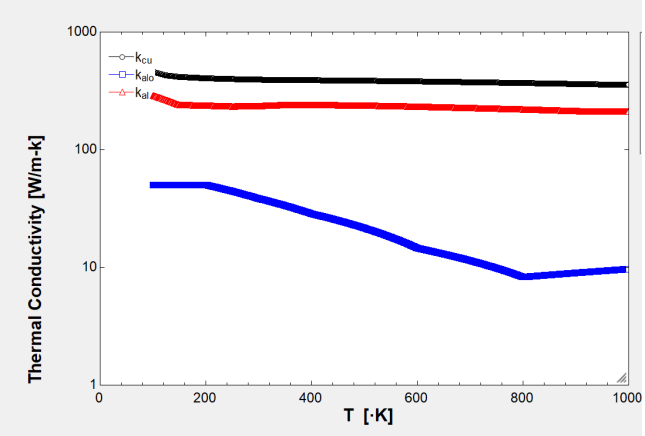
0.1 Problem 1



0.2 Problem 2

0.2.1 a

Unit Settings: SI K MPa kJ mass deg

A = 0.8214 [m²] dtdx = -15333 [C/m] k0 = 178.7 [W/m-C] kf = 162.5 [W/m-C] {162.5 [W/m-C]} $\dot{q}$ = -2.149E+06 [W] {-2149 [kW]}

No unit problems were detected.

Compilation time = 62 ms Calculation time = 16 ms

0.2.2 b

Boundary Condition 1 $T_0 = 290$ Celsius at x = 0m

Boundary Condition 2 $T_f = 60$ Celsius at x = .015m

$$\frac{\partial^2 T}{\partial x^2} = 0$$

$$\frac{\partial T}{\partial x} = C$$

$$T(x) = Cx + D$$

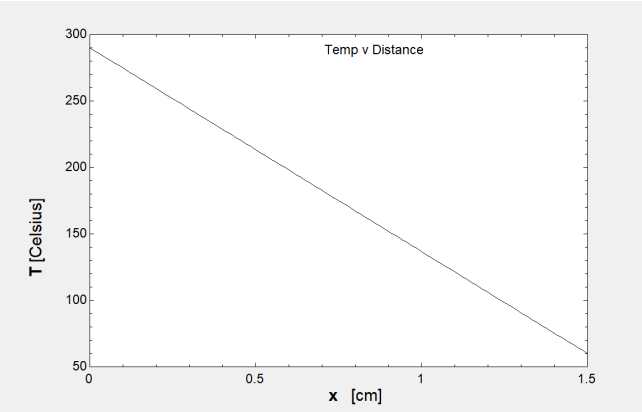
$$T(x_0) = D = 290^\circ C$$

$$T(x_f) = 60 = C * .015 + 290$$

$$\frac{-230}{.015} = C$$

$$T(x) = \frac{-230}{.015}x + 290$$

0.2.3 c

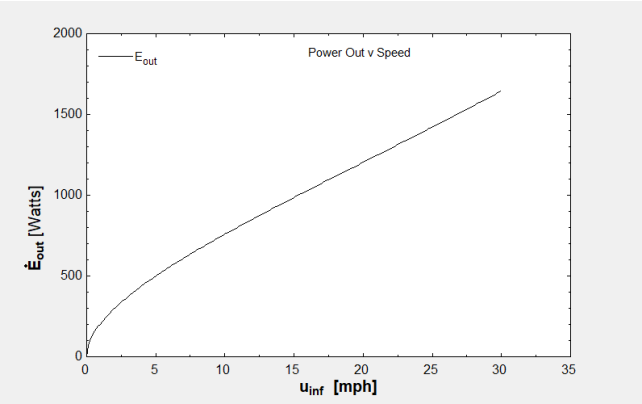


0.2.4 d

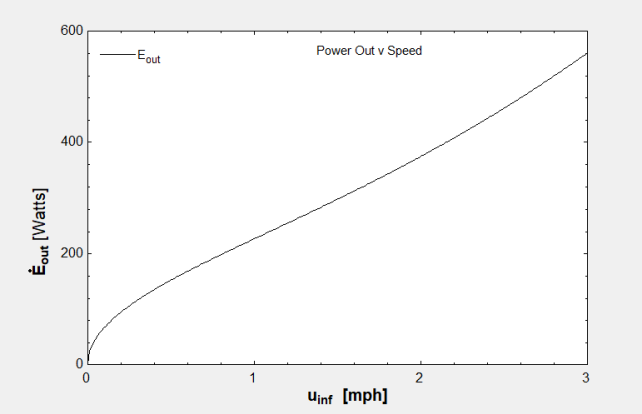
-2149 kW

0.3 Problem 3

0.3.1 a



0.3.2 b



0.3.3 c

The water would kill the person significantly quicker than the air. Neither is a good idea!