

Test #1

given

$$(2) d = 1/8 \text{ in} \rightarrow 0.010417 \text{ ft}$$

data?
variable
(0.5)

$$(A_c) = \pi \left(\frac{0.010417}{2} \right)^2 = 8.522 \times 10^{-5} \text{ ft}^2$$

$$(P) = \pi (0.010417) = 0.032725 \text{ ft}$$

$$h = 0.9 \text{ BTU/hr} \cdot \text{ft}^2 \cdot \text{R}$$

$$T_b = 1600 \text{ F}$$

$$T @ 1 \text{ ft} = 100 \text{ F} \quad T_\infty = 80 \text{ F}$$

$$L = 3 \text{ ft}$$

Pinned
A to P

$$\frac{T(x) - T_\infty}{T_b - T_\infty} = \frac{\cosh(m(L-x))}{\cosh(mL)}$$

didn't
justifyGauss
(12)

$$\frac{100 - 80}{1600 - 80} = \frac{\cosh(m(3-1))}{\cosh(m \cdot 3)}$$

$$\sinh(m) \cdot 0.01316 - \frac{\cosh(2m)}{\cosh(3m)} = 0$$

$$\frac{e^{2m}/2}{e^{3m}/2} = e^{-m}$$

$$\text{so } e^{-m} = 0.01316$$

$$-m = \ln(0.01316)$$

$$-m = -4.33 = 4.33$$

solved
for msolved
for k

$$m^2 = \frac{hP}{kA_c}$$

$$k = \frac{hP}{m^2 A_c}$$

$$\frac{(0.9)(0.032725)}{(4.33)^2 \cdot (8.522 \times 10^{-5})}$$

$$k = 18.43 \text{ BTU/hr} \cdot \text{ft} \cdot \text{R}$$

final result