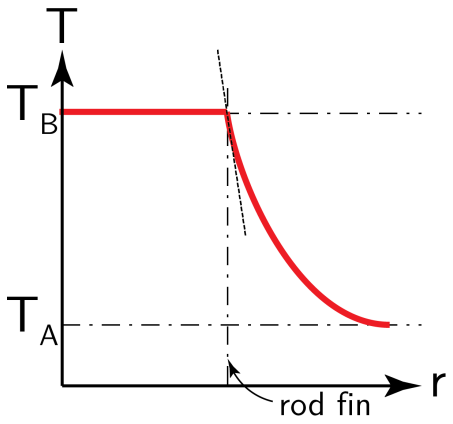
Fins - Temperature 1

Air flows around a rod-fin with a free-stream temperature of T_A, while the temperature at the center of the fin is T_B. Finite heat flux is transferred to the environment and there is no heat source in the fin. Pick the correct temperature profile in the radial direction for $\mathrm{Bi} \to 0$**.**



Since $\mathrm{Bi} \ll 1$, the conductive resistance inside the body is much smaller than the convective resistance outside. Therefore the temperature decrease is the biggest for the outside and negligible inside. Furthermore, when moving away from the center of the rod-fin, the temperature eventually approaches the ambient temperature with a horizontal slope. Also, the slope should be horizontal at the center due to symmetry.