$t_1 := \text{time}(0)$

$\mu\text{rad} \equiv 10^{-6} \cdot \text{rad}$ $\quad$ $\text{mrad} \equiv 10^{-3} \cdot \text{rad}$ $\quad$ $\mu\text{m} \equiv 10^{-6}\,\text{m}$ $\quad$ $\text{nm} := 10^{-9}\,\text{m}$

$\text{ms} \equiv 10^{-3} \cdot \text{s}$ $\quad$ $\mu\text{s} \equiv 10^{-6}\,\text{s}$ $\quad$ $\text{ns} \equiv 10^{-9} \cdot \text{s}$ $\quad$ $\text{kt} \equiv 1852 \dfrac{\text{m}}{\text{hr}}$ $\quad$ $\text{nmi} := 1852 \cdot \text{m}$ $\quad$ $°\text{C} \equiv \text{K}$

$c \equiv 2.99792458 \cdot 10^{8} \dfrac{\text{m}}{\text{s}}$ $\quad$ $h \equiv 6.62606876 \cdot 10^{-34}\,\text{J} \cdot \text{s}$ $\quad$ $r_e \equiv 6378140 \cdot \text{m}$ $\quad$ $\sigma \equiv 5.670400 \cdot 10^{-8} \cdot \dfrac{\text{watt}}{\text{m}^2 \cdot \text{K}^4}$

$\text{mJ} \equiv 10^{-3}\,\text{J}$ $\quad$ $\text{MW} \equiv 10^{6}\,\text{W}$ $\quad$ $\text{nW} \equiv 10^{-9}\,\text{W}$ $\quad$ $\mu\text{W} \equiv 10^{-6}\,\text{W}$ $\quad$ $\text{mW} \equiv 10^{-3}\,\text{W}$ $\quad$ $\text{time}(0) - t_1 = 0.1090$

$T_s := 70\text{K}$ $\quad$ $T_a := 49\text{K}$ $\quad$ $T_d := 22\text{K}$

Given

$$1120 \frac{\text{W}}{\text{m}^2} = 2.5 \frac{\text{W}}{\text{m}^2\text{K}} \cdot (T_s - T_a) + \sigma \cdot .9 \cdot \left[(T_s + 273\text{K})^4 - (T_a + 273\text{K})^4 \right] + \frac{1.7 \dfrac{\text{W}}{\text{m} \cdot \text{K}}}{1\text{ft}} \cdot (T_s - T_d)$$

$\text{Find}(T_s) = 106.2429\ \text{K}$

Given

$$1400 \frac{\text{W}}{\text{m}^2} = 2.5 \frac{\text{W}}{\text{m}^2\text{K}} \cdot (T_s - T_a) + \sigma \cdot .9 \cdot \left[(T_s + 273\text{K})^4 - (T_a + 273\text{K})^4 \right] + \frac{1.7 \dfrac{\text{W}}{\text{m} \cdot \text{K}}}{1\text{ft}} \cdot (T_s - T_d)$$

$\text{Find}(T_s) = 120.3496\ \text{K}$