2. Heat flux (4 pts)

1) The heat flux $P = \dfrac{\Delta T\, s}{\rho d}$, hence $\Delta T = \dfrac{P\rho d}{s} \approx 12\,\mathrm{K}$.

2) By a constant heat flux P, the temperature change along the wire $\Delta T = \dfrac{P\rho\,\Delta x}{S}$, where Δx is a displacement along the wire. Hence the temperature drop $t_1 - t_2 = \dfrac{P\mathcal{S}}{S}$, where $\mathcal{S}$ is the surface under the graph. Thus, $P = \dfrac{(t_1 - t_2)\, S}{\mathcal{S}}$. Using the graph we find $\mathcal{S} \approx 50\,\mathrm{Kcm^2/W}$ and $P \approx 20\,\mathrm{mW}$.