

# PHYS 3800 “Optics”

## Homework#1: Nature of Light / Radiation

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The Planck blackbody spectral radiance formula is given as

$$M_{\lambda} = \frac{2 \cdot \pi \cdot h \cdot c^2}{\lambda^5} \cdot \frac{1}{\exp\left[\frac{h \cdot c}{\lambda \cdot T \cdot k}\right] - 1}$$

1. Derivate the Wien’s displacement law from the Planck blackbody spectral radiance formula.

( Use  $\frac{dM_L}{d\lambda} = 0$  to find  $\lambda_{\max}$ .)

2. Derivate the Stefan-Boltzmann law from the Planck blackbody spectral radiance formula.

( Hint: substitute  $x = \frac{h \cdot c}{\lambda \cdot k \cdot T}$  to facilitate the integration )