1) Find n_{max} for $B_n(n,T)$ (approximately)

$$B_n(n,T) = \frac{2hc^2 n^3}{\exp\left(\frac{hc}{k_B T} n\right) - 1}$$

$$\sim n^3 C_1 \left(\exp(C_2 n)\right)^{-1}$$

$$\frac{dB_n}{dn} = 3n^2 C_1 \left(\exp(C_2 n)\right)^{-1} - n^3 C_1 \left(\exp(C_2 n)\right)^{-2} \exp(C_2 n) C_2 = 0$$

Cancelling terms yields

$$3 - C_2 n = 0$$

$$n_{max} = \frac{3}{C_2}$$

Plugging in numbers from notebook I get for $T = 300$, $n_{max} = 624\ cm^{-1}$

$$\lambda = 1/n_{max} = 16\ \mu m$$

Take $\log(B_n)$ and get the same answer

$$\log B_n = \log C_1 + 3 \log n - C_2 n$$

$$\frac{d \log B_n}{dn} = 0 + \frac{3}{n} - C_2 = 0$$

$$n_{max} = \frac{3}{C_2}$$

$$\frac{d^2 \log B_n}{dn^2} = -3n^{-2}$$ which is < 0 for pos n