

HW 9/20

3.12)

$$70^\circ\text{F} = 294\text{K}$$

$$\lambda_{\text{max}} T = 2.898 \cdot 10^{-3} \text{ m}\cdot\text{K}$$

$$\lambda_{\text{max}} = \frac{2.898 \cdot 10^{-3} \text{ m}\cdot\text{K}}{294\text{K}} = \boxed{9850 \text{ nm}} \quad (\text{infrared})$$

3.27)

$$h = 6.6260690 \cdot 10^{-34} \text{ J}\cdot\text{s}$$

$$c = 2.99792458 \cdot 10^8 \text{ m/s}$$

$$e = 1.60217649 \cdot 10^{-19} \text{ C} \quad (\text{J/eV})$$

$$\frac{(6.6260690 \cdot 10^{-34} \text{ J}\cdot\text{s})(2.99792458 \cdot 10^8 \text{ m/s})}{1.60217649 \cdot 10^{-19} \text{ J/eV}} \cdot \frac{10^9 \text{ nm}}{1 \text{ m}} = \boxed{1240 \text{ eV}\cdot\text{nm}}$$

ep10)

$$\lambda_1 = 400 \text{ nm} \quad E = \frac{hc}{\lambda}$$

$$\lambda_2 = 700 \text{ nm}$$

$$E_{\lambda_1} = 4.970 \cdot 10^{-19} \text{ J}$$

$$E_{\lambda_2} = 2.840 \cdot 10^{-19} \text{ J}$$

$$\Rightarrow \boxed{2.84 \cdot 10^{-19} \text{ to } 4.97 \cdot 10^{-19} \text{ J}}$$

ep11)

a)  $f = 1 \cdot 10^6 \text{ Hz}$

$$c = f\lambda$$

$$\left( f = \frac{c}{\lambda} \right)$$

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$$E = hf \rightarrow E = \frac{(6.6260690 \cdot 10^{-34} \text{ J}\cdot\text{s})(1 \cdot 10^6 \text{ Hz})}{1.60217649 \cdot 10^{-19} \text{ J/eV}}$$

$$\boxed{E = 4.1361 \cdot 10^{-9} \text{ eV}}$$

b)  $E = hf \rightarrow E = \frac{(6.626 \cdot 10^{-34} \text{ J}\cdot\text{s})(3 \cdot 10^{18} \text{ Hz})}{1.60218 \cdot 10^{-19} \text{ J/eV}} = \boxed{12,408 \text{ eV}}$