HW 2 CORRECTION for AB magnitudes

AB mags - correction

$f_\nu^{(AB)} = \text{const} = 3.63 \times 10^{-20}$ erg s^{-1} cm^{-2} Hz^{-1}

$f_\lambda^{(AB)} = \frac{c}{\lambda^2} f_\nu^{(AB)} = \frac{0.1092}{\lambda^2}$ erg s^{-1} cm^{-2} Å^{-1}

$f_\lambda d\lambda = f_\nu d\nu$

* AB mags are based on flux density, not flux (this was the error)

where one must integrate across filter response to obtain flux

$$F = \frac{\int R(\nu) f_\nu d\nu}{\int R(\nu) d\nu} = \frac{\int R(\lambda) f_\lambda d\lambda}{\int R(\lambda) d\lambda}$$

- AB mags for frequency flux densities, f_ν

$$m_{band}^{(AB)} = -2.5 \log \left\{ \frac{f_\nu}{f_\nu^{(AB)}} \right\} = -2.5 \log f_\nu - 48.60$$

where ν for object's f_ν is chosen at filter peak

- AB mags for wavelength flux densities, f_λ

$$m_{band}^{(AB)} = -2.5 \log \left\{ \frac{f_\lambda}{f_\lambda^{(AB)}} \right\} = -2.5 \log f_\lambda - 5 \log \lambda - 2.404$$

where λ is chosen at filter peak

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actually, the exact ν or λ should be the mean value due to the filter response, i.e.

$$\langle \nu \rangle = \frac{\int R(\nu) \nu d\nu}{\int R(\nu) d\nu} \qquad \langle \lambda \rangle = \frac{\int R(\lambda) \lambda d\lambda}{\int R(\lambda) d\lambda}$$

but, you can simply assume $\nu = \langle \nu \rangle$ at filter peak or $\lambda = \langle \lambda \rangle$ at filter peak.