Algorithms and applications in computer vision, Spring 2021, Quiz #1
Due: April 5, 1:00AM

Consider an illumination source with a spectrum consisting of 3 isolated spikes at 450, 550, 650 nm

We consider three cameras with three different sensor sensitivity functions
$\Phi_b(\lambda) = \Pi_{450,50}(\lambda)$, $\Phi_g(\lambda) = \Pi_{550,50}(\lambda)$, $\Phi_r(\lambda) = \Pi_{650,50}(\lambda)$

$\Theta_b(\lambda) = 0.5\mathrm{G}_{450,50}(\lambda)$, $\Theta_g(\lambda) = \mathrm{G}_{550,50}(\lambda)$, $\Theta_r(\lambda) = \mathrm{G}_{650,50}(\lambda)$

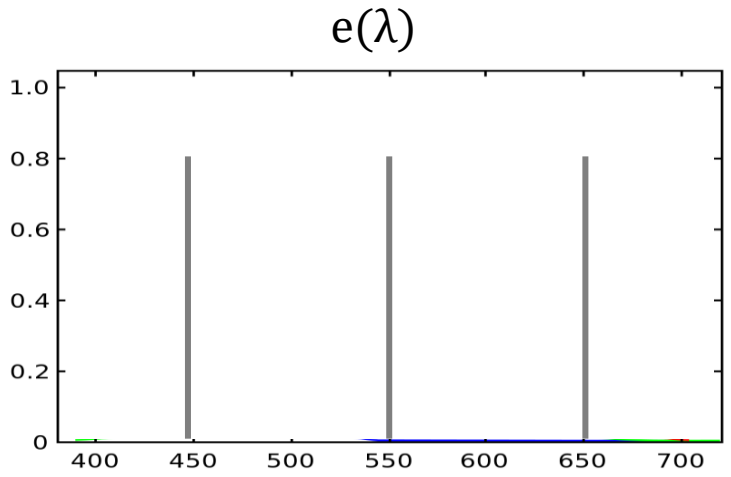
$\Psi_b(\lambda) = \mathrm{G}_{450,50}(\lambda)$, $\Psi_g(\lambda) = \mathrm{G}_{550,50}(\lambda)$, $\Psi_r(\lambda) = \mathrm{G}_{600,70}(\lambda)$

Where: $\Pi_{\mu,w}(\lambda) = \begin{cases} 1 & |\lambda - \mu| < w \\ 0 & otherwise \end{cases}$ $\qquad$ $G_{\mu,\sigma}(\lambda) = \exp\left(\frac{-(\lambda-\mu)^2}{2\sigma^2}\right)$

Suggest a 3x3 white balancing transformation converting the RGB values of the second and third camera to the first one.
Please consider: (i) A diagonal white balancing transformation. (ii) A general 3x3 white balancing transformation.

Your answer can contain formulas (e.g. the inverse of a certain matrix), no need to evaluate exact numbers

Illumination spectrum



sensor sensitivity functions