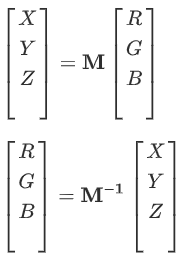
**Coding Assignment 1**

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The standard CIE xyz matching functions have been used in this assignment. These matching functions are analogous to the l, m, s responses to our brain. They are related by the following equation:

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where the M matrix has the L, M, S tristimulus values for Red, green and Blue primary monochromatic light source.

**TASK-1 Observations and Discussion**

TASK 1 : Uniform reflectance different illuminants

RGB Values for uniform\_spectra is [4.9999974 5.00000082 4.9999284 ]

RGB Values for philips\_spectra is [2.22760314 0.99755721 0.30182545]

RGB Values for silvania\_spectra is [3.43375938 1.96024552 0.65181965]

* Tristimulus values X, Y and Z had to be calculated from the given spectral tristimulus discrete values 𝑥(𝜆), 𝑦(𝜆) & 𝑧(𝜆) using 𝑋 = ∫ 𝐶(𝜆)𝑥(𝜆)𝑑𝜆, 𝑌 = ∫ 𝐶(𝜆)𝑦(𝜆)𝑑𝜆, 𝑍 = ∫ 𝐶(𝜆)𝑧(𝜆)𝑑𝜆.
* The integrals were calculated using the trapz function of numpy where it is approximated by trapezoidal rule.
* Since this task involved the representation of a true white object , unity reflectance used for all wavelengths. Using this reflectance and the illuminant spectra given for uniform, silvania and philips, the power spectrum or Radiance was calculated using E(λ) = I(λ)\*R(λ) where R(λ) is the reflectance matrix and I(λ) is the illuminant matrix.
* Equal values were observed only for uniform illuminant which showed that illuminant also has a role in determining color perception.

**TASK-2 Observations and Discussion**

TASK 2 : Uniform illuminants different reflectance

RGB Values for object\_x is [4.73066155 2.0265892 1.11929074]

RGB Values for object\_y is [2.84601449 3.81928062 0.36328887]

RGB Values for object\_z is [-0.33613932 0.3020626 3.71801045]

* For object-z a negative value of R was observed which is mathematically acceptable whereas it is physically unrealizable.
* This means the target spectrum E(λ) couldn’t be matched by primaries corresponding to RGB tristimulus spectra and we had to add the primary corresponding to R to E(λ) , in order to match using the other two primaries.
* To avoid negative RGB values, the CIE XYZ system was put in place although the primaries are hypothetical.