$$C = \begin{bmatrix} l_1 & l_2 & l_3 \\ m_1 & m_2 & m_3 \\ s_1 & s_2 & s_3 \end{bmatrix} \quad ; \quad \begin{aligned} l &= (l_1 \ l_2 \ l_3) \\ M &= (m_1, m_2, m_3) \\ S &= (s_1, s_2, s_3) \end{aligned}$$

$$\vec{l} \cdot \vec{M} = \vec{M} \cdot \vec{S} = \vec{S} \cdot \vec{l} = 0.$$

We define P as,

$$P = \begin{bmatrix} \frac{l_1}{|L|^2} & \frac{m_1}{|m|^2} & \frac{s_1}{|s|^2} \\ \frac{l_2}{|L|^2} & \frac{m_2}{|M|^2} & \frac{s_2}{|s|^2} \\ \frac{l_3}{|L|^2} & \frac{m_3}{|M|^2} & \frac{s_3}{|s|^2} \end{bmatrix}$$

Since c is positive, P is also positive. We are just dividing by square of magnitude.

Now,

$$C \cdot P = \begin{bmatrix} \frac{1}{|L|^2} \cdot l_1^2 + l_2^2 + l_3^2 & 0 & 0 \\ 0 & \frac{1}{|M^2|}(m_1^2 + m_2^2 + m_3^2) & 0 \\ 0 & 0 & \frac{1}{|S|^2}(s_1^2 + s_2^2 + s_3^2) \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$\Rightarrow C \cdot P = I$

$\Rightarrow$ This proves P is valid set of primaries.

$$C = \begin{bmatrix} l_1 & l_2 & l_3 \\ m_1 & m_2 & m_3 \\ s_1 & s_2 & s_3 \end{bmatrix} \quad ; \quad \begin{aligned} l &= (l_1 \ l_2 \ l_3) \\ M &= (m_1, m_2, m_3) \\ S &= (s_1, s_2, s_3) \end{aligned}$$

We define P as,

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We define P as,

$$\vec{l} \cdot \vec{M} = \vec{M} \cdot \vec{s} = \vec{s} \cdot \vec{l} = 0.$$

$$P = \begin{bmatrix} \frac{l_1}{|L|^2} & \frac{m_1}{|m|^2} & \frac{s_1}{|s|^2} \\ \frac{l_2}{|L|^2} & \frac{m_2}{|M|^2} & \frac{s_2}{|s|^2} \\ \frac{l_3}{|L|^2} & \frac{m_3}{|M|^2} & \frac{s_3}{|s|^2} \end{bmatrix}$$

Since c is positive, P is also positive. We are just dividing by square of magnitude.

Now,

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Now,

$$C \cdot P = \begin{bmatrix} \frac{1}{|L|^2} \cdot l_1^2 + l_2^2 + l_3^2 & 0 & 0 \\ 0 & \frac{1}{|M^2|}(m_1^2 + m_2^2 + m_3^2) & 0 \\ 0 & 0 & \frac{1}{|S|^2}(s_1^2 + s_2^2 + s_3^2) \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

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