5. Suppose we use a new set of color-matching functions $\bar{x}^{new}(\lambda)$, $\bar{y}^{new}(\lambda)$, $\bar{z}^{new}(\lambda)$ with values

λ (nm)	$\bar{x}^{new}(\lambda)$	$\bar{y}^{new}(\lambda)$	$\bar{z}^{new}(\lambda)$
450	0.2	0.1	0.5
500	0.1	0.4	0.3
600	0.1	0.4	0.2
700	0.6	0.1	0.0

In this system, what are the chromaticity values (x, y) of equi-energy white light $E(\lambda)$ where $E(\lambda) \equiv 1$ for all wavelengths λ? Explain.

7. Suppose image file values are in $0..255$ in each color channel. If we define $\overline{R} = R/255$ for the red channel, we wish to carry out gamma correction by passing a new value $\overline{R}'$ to the display device, with $\overline{R}' \simeq \overline{R}^{1/2.0}$.

It is common to carry out this operation using integer math. Suppose we approximate the calculation as creating new integer values in $0..255$ via

$$(int)\,(255 \cdot (\overline{R}^{1/2.0}))$$

(a) Comment (very roughly) on the effect of this operation on the number of actually available levels for display. *Hint*: Coding this up in any language will help you understand the mechanism at work better — and will allow you to simply count the output levels.

(b) Which end of the levels $0..255$ is affected most by gamma correction — the low end (near 0) or the high end (near 255)? Why? How much at each end?