Specification of ROMM RGB.
(Specified in the US Standard ANSI/I3A IT10.7666:2003.)

Chromaticity co-ordinates of primaries:
R: x=0.7347, y=0.2653, z=0;
G: x=0.1596, y=0.8404, z=0;
B: x=0.0366, y=0.0001, z=0.9633.

Gamma: 1.8 (see precise specification below).

The reference white for ROMM RGB is specified as D50 (i.e. chromaticity co-
ordinates of x=0.3457, y=0.3585; z=0.2958).

Conversion from XYZ (D50) to ROMM RGB:
\[
\begin{bmatrix}
Rr \\
Gr \\
Br
\end{bmatrix} = \begin{bmatrix}
1.3460 & -0.2556 & -0.0511 \\
-0.5446 & 1.5082 & 0.0205 \\
0.0 & 0.0 & 1.2123
\end{bmatrix}
\begin{bmatrix}
X \\
Y \\
Z
\end{bmatrix}
\]
where XYZ are normalised such that Y=1 and values of RGB outside of 0-1 are
clipped.

If Rr, Gr, or Br are less than 0.001953
\[
\begin{align*}
R &= Rr \times 16 \\
G &= Gr \times 16 \\
B &= Br \times 16
\end{align*}
\]
If Rr, Gr, or Br are greater than or equal to 0.001953
\[
\begin{align*}
R &= Rr^{1/1.8} \\
G &= Gr^{1/1.8} \\
B &= Br^{1/1.8}
\end{align*}
\]

Hints for Profile makers:

1) D50 referenced characterisation data

When normalised such that Y=1 for the reference white, the tristimulus values of the
primaries and white are:
R: X=0.7977, Y=0.2881, Z=0.0;
G: X=0.1352, Y=0.7118, Z=0.0;
B: X=0.0314, Y=0.0001, Z=0.8249
White: X=0.9642, Y=1.00, Z=0.8249

The matrix to convert XYZ to linear ROMM RGB (i.e. prior to application of the
non-linear function) is that given above.

2) Measurement ‘correction’
The above transformation produces 1 and 0 in each of RGB when XYZ is set to 0.9642, 1, 0.8249 and 0, 0, 0 respectively. However, in practice some degree of flare will be present if ROMM RGB is intended to represent a real viewing situation. The amount of this flare will vary with the actual conditions used. However, it has been concluded by the committee developing ISO 22028-1 (a standard pertaining to colour image encodings) that for measurement consistency a level of flare should be assumed for colour encodings that is consistent with the 0/45 measurement condition assumed for ICC PCS measurements. In this context the specification states that the reference white should be assumed to have a luminance of 142 cd/m² and the reference black a luminance slightly under 0.5 cd/m². So, it is recommended that profile makers utilise this information when producing profiles and assume the black point has a Y value of 0.003473 when the white is 1. This correction can be achieved by applying the following corrections to the computed RGB values:

\[
\begin{align*}
\text{ROMMRGB}' &= 0.003473 + 0.0622829 \times \text{ROMMRGB} \quad \text{ROMMRGB} < 0.03125 \\
\text{ROMMRGB}' &= 0.003473 + 0.996527 \times (\text{ROMMRGB})^{1.8} \quad \text{ROMMRGB} \geq 0.03125
\end{align*}
\]