

Tutorial 5: Colour

A colour is defined by the following three tri-stimulus intensities obtained during a colour matching experiment:

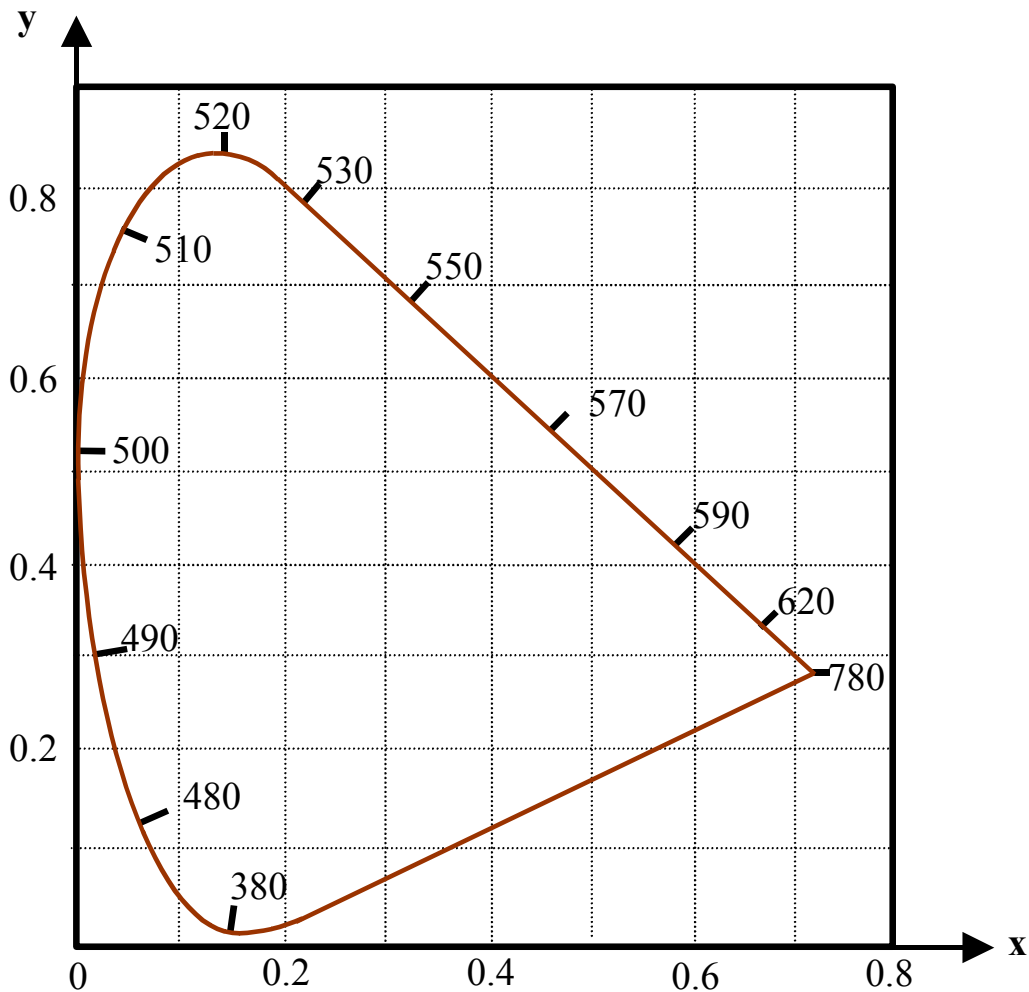
$$r=3 \quad g=3 \quad b=6$$

1. What is its (x,y) coordinate on the CIE diagram
2. Plot this point on the CIE diagram and construct a line on the CIE diagram and a measurement of of:
 - 2.1 The wavelength of the corresponding pure hue
 - 2.2 The wavelength of the complement of its pure hue
 - 2.3 The coordinate of the corresponding pure hue
 - 2.3 The saturation of the colour.

3. A monitor has is calibrated and the three phosphors have the following CIE diagram co-ordinates:

	x	y
Red	0.62	0.34
Green	0.27	0.59
Blue	0.15	0.07

Plot the area of colours that can be displayed by the monitor on your CIE diagram



PTO

4. The monitor is driven by a computer system that represents colours by (R,G,B) values in the range 0..255. Find the matrix that will convert RGB values into x,y,z coordinates.

5. The inverse of the matrix of Q4 should be:

$$\begin{array}{ccc} 542 & -228 & -84 \\ -316 & 574 & 9 \\ 29 & -91 & 330 \end{array}$$

(You can use this to check your result)

Compute the RGB values that would be used to represent the original colour defined in part 1.

6. Using the RGB result from part 5 calculate the corresponding HSI values of the colour.

7. A colour given by point $x=0.1$, $y=0.2$ on the CIE diagram cannot be represented by the light sources of the monitor. How could a light source of this colour be calibrated by subtractive matching, using light sources with the same coordinates as the monitor.