Test 1: Example #8

1. According to the modified barocentric color system of Newton, which one or more of these are true?
   (A) Equal units of orange and blue gives a saturated yellow.
   (B) Two parts blue and one of orange gives a light green.
   (C) Four parts orange and one of blue gives a red orange.
   (a) A
   * (b) B
   (c) C
   (d) A and B
   (e) B and C

2. Colors which are highly saturated are:
   (a) Very bright
   (b) Composed of complementary pairs
   (c) Almost white
   * (d) Almost monochromatic
   (e) Excite all three cone types equally

3. Two spectra are metameric pairs if they:
   * (a) Match in color and brightness as seen by an observer
   (b) Have the same overall brightness
   (c) Include \( \frac{1}{2} \) the total spectrum
   (d) Have the same purity level

4. In the CIE system, the green color-matching function (or “green” primary) is specially designed to:
   (a) Adjust for spectral differences in various sources
   (b) Approximate the visible part of the solar spectrum
   * (c) Approximate the eye’s sensitivity to different wavelengths
   (d) Match the “green line” emission of mercury-vapor
5. Which one or more of these is determined by the x, y color coordinates derived from the tristimulus values?
   (A) Saturation
   (B) Brightness
   (C) Hue
   (a) A
   (b) B
   (c) C
   (d) A and B
   * (e) A and C

6. On a CIE chart, 100% saturation occurs:
   (a) At the “center” where x = 0.33 and y = 0.33  
   * (b) On the spectrum locus (or boundary )
   (c) Anywhere outside the spectrum locus
   (d) None of these

7. Two surfaces, when illuminated by the same source have the same x, y chromaticity values. However, the Y value of surface A is relatively large, and the Y value of surface B is relatively small. Thus:
   (a) The color of B is more saturated than the color of A.
   (b) The color of A is more saturated than the color of B.
   * (c) They are each the same hue, but B is darker.
   (d) They are each the same hue, but A is darker.
   (e) The observer should not be allowed to drive.
Short answer

1. Assume three monochromatic primaries of wavelengths of 600, 510, and 490 nm. Use the CIE chart on the next page to answer the following questions.
   (a) Mark the color coordinates of these three primaries.
   (b) Explain how, if at all, you could produce white light from these sources.
   (c) Explain how, if at all, you could produce magenta.
   (d) Explain how, if at all, you could produce yellow with reasonably good purity.

2. Assume that we have three reflection spectra with color coordinates \((x,y) = \):
   1) \((0.5, 0.3)\)
   2) \((0.3, 0.1)\)
   3) \((0.2, 0.6)\)
   (a) Plot these three on a CIE chart and label them A, B, and C.
   (b) State the dominant wavelength and purity for point C.
   (c) Show what color coordinates are possible from various combinations of these three spectra

3. Suppose that \(X = 40, Y = 90,\) and \(Z = 70.\)
   (a) Compute the color coordinates.
   (b) Mark the point on your CIE chart.
   (c) Describe the color to the best of your memory.