

1. Suppose you are a graphics software designer. You have the following three requirements for your software:

The program should provide an onscreen WYSIWYG image editor

- RGB, since this is the color system used by displays and color monitors

The color manipulation should be intuitive for artists to use

- HSV was inspired by artists and painters, more practical for artists since it decomposes color down to perception rather than how it is physically sensed

The program should be able to print out high quality archival images

- CMYK, produces high quality print outs, K has black as a separate cartridge making it more efficient for printing (Not having to blob 3 colors together)

2. Describe how you would construct an image similar to the one below but without the Mach banding effect.

- Since mach banding is caused by the edge brightness changing very rapidly, you'd want to reduce how sharply the edges transition. Since it seems to start off at black, you could after every 3 columns, increment the RGB by 1. It would create a smooth black to white transition with no mach banding. Width would be 765

3. Give the associated colors for the following pixels labeled A and B, specifying all numbers as integers. Here, we assume 8 bits per color channel. [2pts]

$$R^* = R \cdot A / 255$$

$$G^* = G \cdot A / 255$$

$$B^* = B \cdot A / 255$$

$$A = A$$

Color A 120 240 60 100

R	G	B	A
47	94.1	23.5	100

Color B 100 100 240 200 R G B A

R	G	B	A
78.4	78.4	188.2	200

4. Given your associated colors for pixels A and B above, give the composite associated color pixels A over B, and B over A.

A Over B

$$A_0 = .39 + .78 * (.60)$$

$$R_0 = (.18 + .29(1 - .39)) / .858$$

$$\alpha_o = \alpha_a + \alpha_b(1 - \alpha_a)$$

$$C_o = \frac{C_a \alpha_a + C_b \alpha_b(1 - \alpha_a)}{\alpha_o}$$

$$G_0 = (.36 + .30(.60)) / .858$$

R	G	B	A
.41	.63	.62	.858

B Over A

$$\alpha_o = \alpha_a + \alpha_b(1 - \alpha_a)$$

R	G	B	A
.40	.45	.88	.858