

**Homework #1: Viewing, Color, Images, and Vision**  
**Due Friday, October 5<sup>th</sup>**

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1. Suppose a RGB raster system is to be designed using an 8" x 10" screen with a resolution of 100 pixels per inch in each direction. If we want to store 6 bits per pixel in the frame buffer, how much storage (in bytes) do we need for the frame buffer?
2. Suppose we use a camcorder to film our friend running across a soccer field. We want to freeze the action and look at just one frame.
  - a. Draw a picture of what this frame looks like if the camcorder is capturing *interlaced* video.
  - b. Draw another picture showing what the frame might look like if we switch the camcorder to capture in *progressive* mode.
  - c. How might you convert interlaced video into progressive video so that the freeze frame looks better?
3. You work for AAA Printer Design. Your marketing department issues a press release claiming that your next printer will be 2400dpi. Your competitor is making a 300dpi printer. Assuming that a printed page is viewed from 24" away:
  - a. Consider the limits of human perception and determine what level of resolution is necessary for the printed page to appear completely smooth to the human eye.
  - b. Given this, which of the two companies has a more sensible design?
4. A particular LCD display has  $\gamma = 2$ . If we wish to double the output luminance of the monitor, by what proportion must we increase the transmitted voltage?
5. Wearing sunglasses indoors has suddenly become really cool! However, your cool friends keep bumping into things and misreading signs because they have a hard time perceiving details. You want to fit in, but you want to be safe as well, so you check out the selection of color-tinted sunglasses at the mall.
  - a. What color of sunglass lenses (as viewed while wearing them) should you wear to impress your friends while maximizing your ability to sense details?
  - b. More importantly, why?