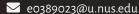
Tutorial 1 CS3241 Computer Graphics (AY22/23)

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To be able to display **realistic** images, our display devices need to be able to produce every frequency in the visible light spectrum.

True or false? Why? What are the advantages and disadvantages?

Three-Color Theory

To be realistic to human

- ⇒ To be compatible with human visual system (Lo1, slide 35)
 - Rods: Monochromatic
 - Cones: Color sensitive to wavelengths
 - ∘ Long \approx red
 - \sim Medium \approx green
 - ∘ Short ≈ blue

Proportion of the three gives us the sensation of different colors.

Cones sensitivity

Additive color

Each pixel in a frame-buffer has 8 bits for each of the R, G and B channels. How many different colors can each pixel represent? Is this enough? On some systems, each pixel has only 8 bits (for all R, G, and B combined). How would you allocate the bits to the R, G and B primaries?

8-bit representation of color

Referring to Lecture 1 Slide 26. If an imaginary image plane is d unit distance in front of the pinhole camera, what are the coordinates of the projection (on the imaginary image plane) of the 3D point (x, y, z)?

Why do we need a primitive assembly stage in the rendering pipeline architecture?

What does the rasterization stage (rasterizer) do in the rendering pipeline architecture? Describe what it does to a triangle that is supposed to be filled, and the three vertices have different color. Assume smooth shading is turned on.

What is hidden-surface removal? When is it not necessary?

Which of the two following program fragments is more efficient? Why? Can the same optimization be done for the case of GL_POLYGON?

OpenGL supports the GL_TRIANGLES primitive type. Why do you think that OpenGL also supports GL_TRIANGLE_FAN and GL_TRIANGLE_STRIP?

Devise a test to check whether a polygon in 3D space is planar.

Devise a test to check whether a polygon on the x-y plane is convex.