

CS184 Fall 06 Review Sheet (Taken from Old Exams) by Nuttapong Chentanez
True / False

- _____ Raytracing traces the paths of light rays from the light to the eye.
- _____ 3D Translation cannot be represented as a 4x4 matrix using homogeneous coordinate.
- _____ Each of the three types of color receptors in the eye is sensitive to a single frequency of light.
- _____ A shear transformation can be decomposed into a series of rotation and scale transformations.
- _____ Homogeneous coordinates are useful because 4D spaces include imaginary vectors.
- _____ Linear perspective projection keeps straight lines straight.
- _____ Every orthonormal matrix defines a rotation.
- _____ Surface shading helps reveal the shape of objects.
- _____ Z buffers may suffer from quantization errors.
- _____ Rotation about an arbitrary axis requires three separate transformation matrices.
- _____ The color of some objects results from wave interference.
- _____ The Bresenham line drawing algorithm only became practical once fast floating point hardware was commonly available.
- _____ In a perspective projection, a sphere can have an outline shaped like an ellipse
- _____ When applying transformations to a 3D scene, the transformation applied to normal vectors should have any translation part doubled.
- _____ Raytracing can be accelerated using BSP-Trees or K-D Trees.

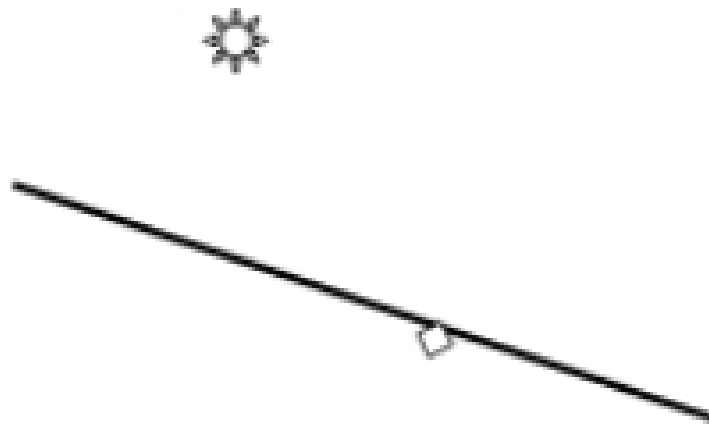
Short Answers

1. Imagine that you have an RGB monitor where the red and blue phosphors have been swapped. When one attempts to display the following, what color will actually appear on the display?

Red _____	Green _____
Blue _____	Yellow _____
Cyan _____	Magenta _____
Black _____	White _____

2. In general, how many vanishing points would a perspective view of a pyramid (four sided base) have? Draw a little sketch to justify your answer.

3. Consider the diagram below. A location has been marked on the surface. Indicate a viewer position such that a viewer looking at the surface from that position would see a specular highlight on the surface at the marked location.



4. When clipping two arbitrarily oriented squares against each other to find their intersection (in 2D), what is the maximum number of sides that the resulting shape may have?

5. A perspective camera has its center of projection at the origin $(0,0,0)$ and its image plane is defined by $z=1$. Assuming that we look along $+z$ axis.

5A. What set of lines vanish at the point $(2,-1,1)$?

5B. Which lines do not vanish at a finite point?

6. Given a rotation matrix, how would you determine its axis of rotation?

7. Given the following: location of center of projection (c)

direction of image plane normal (n)

direction of view up vector (u)

right/left and top/bottom distances (r/l & t/b)

near/far distances (n/f)

Describe how do you set up a viewing transformation that will transform the given setup to the canonical configuration? (You can use the variable names given in parenthesis to refer to the named quantities. Also, the question asks for a

description, not formula. For example if the first step were to rotate the whatever to align with the whateverelse, that is what you should write.)

8. Given the following diagram showing two-dimensional “surface” and the location of the eye, light source, and shading point, annotate the diagram with the light, view, normal, and reflected vectors. Draw the specular lobe assuming a reasonable value for the specular exponent. (If you are concerned about what “reasonable” means, simply indicate the value you have used.)



9. Explain why two colors with very different spectral distributions might still look like the same color when viewed with the human eye.

10. In what way is orthographic projection a special case of perspective projection?

11. Given a quaternion that encodes a rotation, how is the rotation changed by negating the quaternion?