Quiz

CSC321 Computer Graphics

02 December 2016

1. We are working in three dimensions but we are using vectors that contain four elements (not three) and matrices that contain 4×4 elements. What have we gained by choosing 4×4 matrices rather than 3×3 matrices?

WRITE YOUR ANSWER HERE.

2. Many systems (including three.js, the system that we have chosen) support both RGB and HSL color. Distinguish between the two. How does a programmer specify a color using the two systems?

WRITE YOUR ANSWER HERE.

3. Programmers can specify a cubic Bézier curve by providing four points.

   (a) Which of the points will lie on the curve?
   (b) The curve will be contained in the convex hull of the four points. What is the convex hull?
   (c) Let $\vec{p_0}, \vec{p_1}, \vec{p_2}$ and $\vec{p_3}$ be vectors that specify the location of the four points that specify a cubic Bézier curve. What is the geometric significance of $\vec{p_1} - \vec{p_0}$ and $\vec{p_3} - \vec{p_2}$?
   (d) How can a programmer rotate a Bézier curve?

   (a) WRITE YOUR ANSWER HERE.
   (b) WRITE YOUR ANSWER HERE.
   (c) WRITE YOUR ANSWER HERE.

(d) WRITE YOUR ANSWER HERE.

4. The JavaScript language allows programmers to assign functions to variables, to pass a function a to another function b, and to return a function d from another function c to c's caller. This is a powerful feature of the language. What is this feature called?

WRITE YOUR ANSWER HERE.

5. Let $\vec{p_0}, \vec{p_1}$ and $\vec{p_2}$ be vectors that describe the location of the three vertices of a triangle.

What is the geometric signficance of the following expression?

$$\frac{1}{|\ (\vec{p_1} - \vec{p_0}) \times (\vec{p_2} - \vec{p_0})\ |}\ \ ((\vec{p_1} - \vec{p_0}) \times (\vec{p_2} - \vec{p_0}))$$

WRITE YOUR ANSWER HERE.

6. Let $\hat{n}$ and $\hat{s}$ be two vectors. The magnitude of each vector is one. The vector $\hat{n}$ is normal (perpendicular) to some small piece of a surface in our virtual world. The vector $\hat{s}$ points toward the source of light.

What is the signficance of the dot product of these two vectors?

WRITE YOUR ANSWER HERE.