Game 540 Game Computing

Assignment #1

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1. Let and . Calculate the Following



Calculate the angle between the vectors

Calculate the Length of the projection vector

Let x = the length of the projection vector

Calculate the Unit Vector of ***Q***

Calculate the Projection using the normal and the length

1. Calculate the inverse of the Following Matrices

1. Calculate the 3x3 rotation matrices that perform a rotation of 30 degrees about the x, y and z axes
2. What is the 4x4 matrix in homogeneous coordinate form corresponding to a 3D translation by (a,b,c)
3. Construct a 4x4 matrix to rotate 20 degrees about the x-axis and then then translate by [4,2,3]
4. Which of the following affine transformations does NOT affect vectors?

Translation

1. Which of the following mathematical is not useful to compute a normal of triangle?

Vector dot Products

1. An orthogonal set of vectors

Must be a set of linearly independent vectors

1. Fill in the following rotation matrix for rotation around the y-axis
2. True or False
   1. Gimbal lock occurs when pitch is

False

* 1. Modern graphics APIs express orientation using quaternions

False

* 1. Matrix inversion provides a mechanism for determining the “opposite” angular displacement

True

* 1. The numbers in a matrix aren’t intuitive for humans to work with

True

1. Show that you can write a quaternion as a product of its magnitude and a unit quaternion.
2. Consider the quaternions:
   1. Compute the Dot Product
   2. Compute the difference from A to B
   3. Compute the Product AB