

# 3D Geometry Objects

50% (13/26)



1. What is the name of 2 presenters today?

1/1 POINT

- ☐ A Nguyen Duc Anh Phuc & Ngo Van Tan Luu
- ☐ B Ngo Van Tan Luu & Huynh Viet Tuan Kiet
- ☐ C Nguyen Duc Anh Phuc & Truong Thanh Thang
- ☒ D Huynh Viet Tuan Kiet & Nguyen Duc Anh Phuc
- ☐ E Ngo Van Tan Luu & Truong Thanh Thang



2. Which is a correct statement?

0/2 POINTS

- ☒ A 3 collinear points are 3 points in only one plane
- ☐ B There is only one plane going through 3 collinear points
- ☐ C 3 coplanar points may not be collinear
- ☐ D 3 points that are not collinear are definitely not coplanar



3. Why must use matrices in order to represent linear transformations?

3/3 POINTS

- ☐ A Matrices allow arbitrary linear transformations to be displayed in a consistent format suitable for computation
- ☐ B Matrices are easily represented as a computer data structure
- ☐ C The transformation represented as a matrix  $M$  can be undone by applying the inverse of the matrix  $M^{-1}$
- ☐ D Every linear transformation is a matrix transformation
- ☐ E Both A, B, D are correct
- ☐ F A and C are correct
- ☒ G Both A, B, C are correct
- ☐ H Both A, B, C, D are correct
- ☐ I B and C are correct

- ✓ 4. Square matrices are used so that we can perform all transformations using matrix **multiplications**.

1/1 POINT

- ☒ True  
☐ False

$$\begin{bmatrix} 1 & 0 & 0 & T_X \\ 0 & 1 & 0 & T_Y \\ 0 & 0 & 1 & T_Z \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

- ✓ 5. Based on the equation, which is the matrix that rotates around the Oy axis?

3/3 POINTS

- ☐ A  $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & \cos \theta & -\sin \theta & 0 \\ 0 & \sin \theta & \cos \theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$
- ☒ B  $\begin{bmatrix} \cos \theta & 0 & \sin \theta & 0 \\ 0 & 1 & 0 & 0 \\ -\sin \theta & 0 & \cos \theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$
- ☐ C  $\begin{bmatrix} \cos \theta & 0 & -\sin \theta & 0 \\ 0 & 1 & 0 & 0 \\ -\sin \theta & 0 & \cos \theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$
- ☐ D  $\begin{bmatrix} \sin \theta & 0 & \cos \theta & 0 \\ 0 & 1 & 0 & 0 \\ -\cos \theta & 0 & \sin \theta & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

$$X' = X \times \cos \theta + Z \times \sin \theta$$

$$Y' = Y$$

$$Z' = -X \times \sin \theta + Z \times \cos \theta$$

$$\rightarrow \begin{bmatrix} X' \\ Y' \\ Z' \\ 1 \end{bmatrix} = [?] \times \begin{bmatrix} X \\ Y \\ Z \\ 1 \end{bmatrix}$$



6. Which matrix represents this 3D scaling transformation visualization?

0/3 POINTS

A

$$S = \begin{bmatrix} \frac{1}{2}, 0, 0, 0 \\ 0, \frac{1}{2}, 0, 0 \\ 0, 0, \frac{1}{2}, 0 \\ 0, 0, 0, 0 \end{bmatrix}$$

B

$$S = \begin{bmatrix} 2, 0, 0, 0 \\ 0, 2, 0, 0 \\ 0, 0, 2, 0 \\ 0, 0, 0, 1 \end{bmatrix}$$

C

$$S = \begin{bmatrix} 1, 0, 0, 0 \\ 0, 1, 0, 0 \\ 0, 0, 1, 0 \\ 0, 0, 0, \frac{1}{2} \end{bmatrix}$$

D

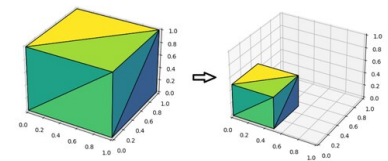
$$S = \begin{bmatrix} \frac{1}{2}, 0, 0, 0 \\ 0, \frac{1}{2}, 0, 0 \\ 0, 0, \frac{1}{2}, 0 \\ 0, 0, 0, \frac{1}{2} \end{bmatrix}$$

E

$$S = \begin{bmatrix} 1, 0, 0, 0 \\ 0, 1, 0, 0 \\ 0, 0, 1, 0 \\ 0, 0, 0, 2 \end{bmatrix}$$

F

$$S = \begin{bmatrix} 2, 0, 0, 0 \\ 0, 2, 0, 0 \\ 0, 0, 2, 0 \\ 0, 0, 0, \frac{1}{2} \end{bmatrix}$$



7. What transformation does this matrix perform?

2/2 POINTS

A

Reflection through the XY plane

B

Reflection through the YZ plane

C

Reflection through the XZ plane

$$\begin{bmatrix} X' \\ Y' \\ Z' \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} X \\ Y \\ Z \\ 1 \end{bmatrix}$$



8. What transformation does this matrix perform?

3/3 POINTS

A

Rotation around the Ox axis 90 degrees

B

Rotation around the Oy axis 90 degrees

C

Rotation around the Oz axis 90 degrees

$$\begin{bmatrix} X' \\ Y' \\ Z' \\ 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times \begin{bmatrix} X \\ Y \\ Z \\ 1 \end{bmatrix}$$

- ✗ 9. Which of the following coordinate performs the translation  $(2, 4, 5)$  and rotates about the z-axis at an angle of 90 degrees at the point  $(1, 1, 1)$ ?

0/3 POINTS

- ☒ A  $(5, 3 - 6)$   
☐ B  $(-5, 3, 6)$   
☐ C  $(-3, 3, 6)$   
☐ D  $(3, 3, -6)$

- ✗ 10. Which of the following matrices performs the reflection  $(2, 4, 5)$  through the YZ plane and shear in the X directions with the parameter  $(0, 4, 7)$  degrees at any point?

0/5 POINTS

- ☐ A  $S = \begin{bmatrix} -1, 0, 0, 0 \\ -4, 1, 0, 0 \\ -7, 0, 1, 0 \\ 0, 0, 0, 1 \end{bmatrix}$   
☒ B  $S = \begin{bmatrix} -1, 0, 0, 0 \\ 4, 1, 0, 0 \\ 7, 0, 1, 0 \\ 0, 0, 0, 1 \end{bmatrix}$   
☐ C  $S = \begin{bmatrix} -1, 0, 0, 0 \\ -4, 1, 0, 0 \\ 7, 0, 1, 0 \\ 0, 0, 0, 1 \end{bmatrix}$   
☐ D  $S = \begin{bmatrix} -1, 0, 0, 0 \\ 4, 1, 0, 0 \\ -7, 0, 1, 0 \\ 0, 0, 0, 1 \end{bmatrix}$