Homework 2

Giacomo Cappelletto

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1 Linear Transformations

A)

I)

$$\begin{bmatrix} 2 & 0 \\ 0 & 2 \end{bmatrix}$$

II)

$$ScalarMatrix$$

B)

I

$$\begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$$

II)

$$Horizontalshear$$

C)

I)

$$\begin{bmatrix} \cos(270^\circ) & -\sin(270^\circ) \\ \sin(270^\circ) & \cos(270^\circ) \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$$

II)

$$RotationMatrix$$

1.1 E)

I)

$$\begin{bmatrix} \cos(180^\circ) & -\sin(180^\circ) \\ \sin(180^\circ) & \cos(180^\circ) \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

II)

$$ReflectionMatrix$$

1.2 F)

I)

$$\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$$

II)

$$Projection(matrix)$$

2 Rotations

2.1 A)

2.1.1 I)

$$\cos(\theta + \phi) = \frac{v_1}{r} \Rightarrow v_1 = r \times \cos(\theta + \phi)$$

$$v = \begin{bmatrix} r \times \cos(\theta + \phi) \\ r \times \sin(\theta + \phi) \end{bmatrix}$$

$$\cos(\theta) = \frac{z_1}{r} \Rightarrow z_1 = r \times \cos(\theta)$$

$$z = \begin{bmatrix} r \times \cos(\theta) \\ r \times \sin(\theta) \end{bmatrix}$$

2.1.2 II)