

Application of Matrices in Architecture Problems

Problem 1 *You have a 2D plan of a room that needs to be rotated 45 degrees around the origin and then translated 5 units to the right and 3 units up.*

1. *Find the transformation matrix for the rotation.*
2. *Find the transformation matrix for the translation.*
3. *Combine these matrices to find the overall transformation matrix.*
4. *Apply this combined transformation to the point (2, 3).*

Problem 2 *A rectangular floor plan needs to be scaled by a factor of 2 along the x-axis and 0.5 along the y-axis, and then reflected over the y-axis.*

1. *Find the scaling matrix.*
2. *Find the reflection matrix.*
3. *Combine these matrices to find the overall transformation matrix.*
4. *Apply this combined transformation to the point (4, 2).*

Problem 3 *Determine the perspective projection matrix for an object located at coordinates (2, 3, 5) viewed from a camera positioned at the origin looking along the z-axis.*