

CSE-4303 CSE5365 Computer Graphics Practice Problems 02

Assuming a right-handed 3-d coordinate system, solve the following problems.

1. Find the parametric equation of a line in a 3-dimensional Cartesian coordinate system which is passing through points $A(2, 5, -4)$ and point $B(-3, 10, 1)$

2. Equation of line AB is given as:
$$\begin{cases} x(t) = 3t + 9 \\ y(t) = -4t - 6 \\ z(t) = 6t \end{cases}$$

Find the equation of line AB after it has been rotated 90 degrees around the y axis.

3. Given point $A(3, 6, -2)$ and plane P as: $3x + 6y - 5z - 30 = 0$. Find the equation of a line which is passing through point A and is perpendicular to plane P .
4. Point $A(3, -4)$ is given in a two dimensional world coordinate system. Find the coordinates of the point A on the screen after it is mapped from window to viewport.

Window coordinates:

$$x_{wmin} = 1, \quad y_{wmin} = -6, \quad x_{wmax} = 10, \quad y_{wmax} = 15$$

Normalized device coordinate of the viewport:

$$x_{vmin} = 0.1, \quad y_{vmin} = 0.25, \quad x_{vmax} = 0.6, \quad y_{vmax} = 0.8$$

The origin of the screen coordinate system is defined in the upper left corner of the screen and the screen resolution is 1600 by 1200. Use truncation to convert from float to integer.

5. Find the equation of a plane which is passing through points $A(1, 4, 2)$, $B(4, -3, 6)$, $C(2, 8, -4)$
6. Equation of plane P is given as $4x - 5y + z + 10 = 0$. Find the equation of this plane after it has been rotated 45 degrees around z axis.
7. Equation of plane P is given as $4x - 5y + z + 10 = 0$. Find the equation of this plane after it has been translated by $dx = 2$, $dy = -5$, $dz = 6$

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8. Given point $A = (4, 2, -1)$ and plane P as $2x - y - 5z - 7 = 0$. Find the distance of point A from the plane P .
9. Find the cross product of two vectors $v_1 = (3, 2, -1)$ and $v_2 = (4, 2, 3)$
10. Find the equation of a plane which is passing through x axis and point $A (3, 1, -4)$