Rotating a point requires

► The coordinates for the point

► The rotation angles

► Both of above Page No 175

► None of above

In Trimetric the direction of projection makes unequal angle with the three principal axes

► True Page No 192

► False

We can draw the circle

► Pentane

► Hexanes

► Trident

► Octants Page No 61

_____transformation produces shape distortions as if objects were composed of layers that are caused to slide over each other.

► Rotation

► Translation

► Reflection

► Shear Page No 124

_____ is the process of describing an object or scene so that we can construct an image of it

► Rendering

► Modeling Page No 159

► Meshing

► None of above

Boundary Filling Algorithm can work for complex polygons.

► True

► False (Not Sure)

Concave polygons are superset of_____ polygons, having fewer restrictions

than _____ polygons.

► Hybrid, Complex

► Concave, Complex

► Convex, Convex Page No. 79

► Complex, Complex

A unit vector has zero magnitude.

► True

► False Page No.169

Each hyperbola consists of two _____.

► Vertices

► Nodes

► Branches Page No. 70

► Points

Parity is a concept used to determine which _____ lie within a polygon.

► Edge

► Vertices

► Pixels Page No.80

► Points

Various curve functions are useful in _____.

► Object modeling

► Graphics applications

► Animation path specifications

► All of the given Page No.69

Polygons are basically concave polygons that may have self-intersecting edges

► Complex Page No.79

► Hybrid

► Convex

► Convex and Hybrid

Concave polygons are a superset of _____ polygons, having fewer restrictions than _____polygons.

► Hybrid, Complex

► Concave, Complex

► Convex, Convex Page No.79

► Complex, Complex

There are _____ basic types of polygon.

► 2

► 3 Page No.81

► 4

► 5

Both Boundary Filling and Flood filling algorithms are _____ as compared to scan line filling algorithm.

► Better (not sure)

► Worse

► Almost same

► Good

We can draw eight points corresponding to each (x , y) point calculation in _____ drawing algorithm.

► Sutherland

► Mid Clipping

► Midpoint Circle Page No.61

► Sutherland Clipping

The horizontal refresh -----------------------------

► Is no longer used in any system

► Is distracting and can cause eye fatigue

► Eye into thinking the horizontal refresh rate is faster

Computer graphics is very helpful in producing graphical representations for scientific visualization.

▶ True Page No.9

▶ False

In video text memory, _____ are used to display a character.

▶ 2 bytes Pages No.43

▶ 4 bytes

▶ 8 bytes

▶ 16 bytes

Locations can be translated or "transformed" from one coordinate system to another.

▶ True Page No.158

▶ False

Vectors can be multiplied in a way

▶ Dot product

▶ Cross product

▶ Both of above

▶ None of given

In Trivial acceptance/reject test there are four bits of nine regions, Bit 4 represents condition _____.

▶ Outside half plane of left edge, to the left of left edge X < Xmin Page No.138

► Outside half plane of right edge, to the right of right edge X > Xmax

► Outside half plane of bottom edge, below bottom edge Y < Ymin

► Outside half plane of top edge, above top edge Y > Ymax

The process of subdivision an entity or surface into one or more non-overlapping primitives.

► Rendering

► Modeling

► Meshing

► None of above Page No. 162

Shortcoming of Sutherland-Hodgeman Algorithm is concave polygons may be displayed with extensors lines

► True Page No.150

► False

A * B = |A| * |B| * cos(?) where ? is the angle between the two vectors

► **Cross Product**

► Dot Product Page No.171

_____is used to move a point, or a set of points, linearly in space

► **Transformation**

► Translation Page No.173

► Scaling

► None of above

Save a line with both endpoints inside all clipping boundaries.

► Trivial Accept Page No.137

► Total inside

► Trivial Reject

► Total outside

_____uses a divide and conquer strategy.

► Sutherland Hodgman clipping Algorithm Page No.244

► Pipeline clipping

► Weiler-Atherton algorithm

► None of above

Each number that makes up a matrix is called an _____ of the matrix.

► Element Page No.101

► Variable

► Value

► Component

Which one of the following step is not involved to write pixel using video BIOS services.

► Setting desired video mode

► Using BIOS service to set color of a screen pixel

► Calling BIOS interrupt to execute the process of writing pixel.

► Using OpenGL service to set color of a screen pixel Page No.45

Shadow mask methods can display a _____ range of colors.

► Small

► Wide Page No.29

► Random

► Crazy

Using Cohen-Sutherland line clipping, it is impossible for a vertex to be labeled 1111.

► True (Not Sure)

► False

Intensity of the electron beam is controlled by setting _____ levels on the control grid, a metal cylinder that fits over the cathode.

► Amplitude

► Current

► Voltage Page No.26

► Electron

Sutherland-Hodgeman clipping algorithm clips any polygon against a concave clip polygon

► True Page No141

► False

(x^2 / a^2) + (y^2 / b^2) = 1 is an equation of _____.

► Parabola

► Hyperbola

► Ellipse Page No.65

► Circle

Translation moves objects without _____.

► Scaling

► Rotation

► Deformation Page no : 113

► Scaling and Rotation

_____ transformation produces shape distortions as if objects

were composed of layers that are caused to slide over each other.

► Rotation

► Translation

► Reflection

► Shear Page no :124

Computer Graphics are used in _____.

► Game development

► Movies development

► Simulations

► All of the given Page no : 6

A two dimensional rotation is applied to an object by repositioning it along a

_____ path in the XY plane

► Straight

► Circular Page no : 114

► Oval

► Ellipse

If the value of scaling factors sx and sy is greater than 1, then size of objects will be _____.

► Reduced

► Enlarged Page no : 116

► Remain same

► Shear

Various curve functions are useful in _____.

► Object modeling

► Graphics applications

► Animation path specifications

► All of the given Page no : 69

Sutherland-Hodgeman clipping algorithm clips any polygon against a concave clip polygon

► True

► False Page no :141

In video text memory, _____ are used to display a character.

► 2 bytes Page no :43

► 4 bytes

► 8 bytes

► 16 bytes

Which of the following is NOT a modern application for Computer Graphics --------

▶ Computer Aided Geometric Design

▶ Video Games

▶ Stop-motion animation Page no : 6

▶ Scientific Visualization

A * B = |A| * |B| * cos(?) Where ? is the angle between the two vectors

▶ Cross Product

▶ Dot Product Page no : 171

In Trimetric the direction of projection makes unequal angles with the three

principal axes

▶ True Page no : 192

▶ False

_____ uses a divide-and-conquer strategy.

▶ Pipeline Clipping

▶ Sutherland-Hodgeman clipping algorithm Page no :244

▶ Weiler-Atherton clipping algorithm

▶ None of above

Finding unit vector is done by simply dividing each component by the width.

▶ True

▶ False Page no : 169

_____ is the process of describing an object or scene so that we can

construct an image of it

▶ Rendering

► Modeling Page no : 251

► Meshing

► None of above

The process of moving the points so that the POV is at the origin looking down the +Y axis is called normalization.

► True

► False Page no : 175

A _____ can be performed relative to a selected reflection axis or with respect to a selected reflection plane.

► rotation

► projection

► reflection Page no : 186

► none of given

To show 256 colors , the no of bits required for each pixel are

► 8 (as per formula 256 takes 28 so 8 –bits are required.)

► 16

► 32

► 64

25 * 80 resolution with 16 colors supports

► Text mode Page no : 43

► Graphics mode

► Both

► None

Two matrices are said to be equal, if they have

   ► Same order

   ► Same corresponding elements

   ► Same order and same corresponding elements. Page no : 103

   ► Different elements

Two points are said to be collinear, if they lie on the

   ► Same line Page no : 53

   ► Different but parallel lines

   ► Either on the same plane or two parallel planes different plane .

A Polygon is convex, if the line connecting:

   ► Any two points outside the polygon intersects its boundary

   ► Any two points inside the polygon don't intersect any edges of the

polygon.

   ► A point inside the boundary with any point outside, does not intersect the

polygon boundary

   ► Any two vertices, intersects some edge of polygon. Page no: 78

The father of Computer Graphics is:

   ► Robert Burton

   ► Ivan Sutherland

   ► Pytor Tchaikovsky

   ► Turner Whitted

The equation of hyperbola centered at origin (if the transverse axis is along x axis) can be given as:

- ► $x^2 b^2 + y^2 a^2 - 1 = 0$
- ► $x^2 b^2 + y^2 a^2 + 1 = 0$
- ► $x^2 a^2 - y^2 b^2 - 1 = 0$
- ► $x^2 b^2 - y^2 a^2 - 1 = 0$

Which of the following statements is not true about flood-fill and boundary-fill Algorithms?

- ► Both are used for filling of close figure
- ► Both can be implemented as recursive as well as iterative methods
- ► Flood-fill is best for filling of triangle
- ► A complex polygon can be filled with 8 connected approaches

Which one is not valid out code to perform trivial accept / reject test in line clipping:

- ► 1101
- ► 1001
- ► 0101
- ► 0110

Which one of the following is not the graphics library is use:

- ► FastGL
- ► OpenGL
- ► DirectX

► EasyGL

The circle and ellipse are symmetric across 8 octants.

► True

► False Page no : 66

UV light is used in Plasma Panel displays to excite phosphor.

► True Page no : 30

► False

Which of the following is not true about matrices?

► A + B = B + A

► a(A + B) = aA + aB

► (AT)T = AT Page no :107

► A + (B + C) = (A + B) + C

According to Odd Parity Rule, a point is inside the polygon, if:

► Line from an outside point to this point does not cross the edges odd number of times

► Line from any point to this point crosses the edges odd number of times. Page no: 80

► Line from an outside point to this point crosses the edges odd number of times

► Line from this point to any point outside the polygon intersects any edge

As opposed to direct memory access method, BIOS routines provide an easier and faster method of drawing pixels on screen.

► True

► False Page no : 48

The amount of time it takes to illuminate a specific location on phosphor coated screen is called Persistence.

► True Page no : 27

► False

Incremental line drawing algorithm makes use of the equation of straight line.

► True Page no : 53

► False

Parity Rule is used to determine whether a pixel is inside a polygon or not.

► True Page no : 80

► False

In Pixmap exactly one bit is used to hold color value of each pixel.

► True

► False Page no : 28

When dot product of two vectors equals zero, this implies that the two vectors are:

► Parallel to each other

► Orthogonal (perpendicular) to each other. Page no : 172

► Intersect each other

► Equal to each other

The Boundary Fill and Flood Fill algorithms:

► Must use 4-connected approach

► Must use 8-connected approach

► May use 4-connected or 8-connected approach Page no : 100

► Must not use recursive approach

Intensity of the electron beam is controlled by setting _____ levels on the control grid, a metal cylinder that fits over the cathode.

► Amplitude

► Current

► Voltage Page no : 26

► Electron

Shadow mask methods can display a _____ range of colors.

► Small

► Wide Page no : 20

► Random

► crazy

Which one of the following step is not involved to write pixel using video BIOS services.

► Setting desired video mode

► Using bios service to set color of a screen pixel

► Calling bios interrupt to execute the process of writing pixel.

► Using OpenGL service to set color of a screen pixel Page no :45

Each number that makes up a matrix is called an _____ of the matrix.

► Element Page no : 101

► Variable

► Value

► Component

Questions:

1. What are the two focusing methods in CRT? Explain briefly.

Answer: Page no : 26

1. Electrostatic focusing

2. Magnetic focusing

In electrostatic focusing the electron beam passes through a positively charged metal cylinder that forms an electrostatic lens. Then electrostatic lens focuses the electron beam at the center of the screen.

Similar task can be achieved with a magnetic field setup by a coil mounted around the outside of the CRT envelope. Magnetic lens focusing produces the smallest spot size on the screen and is used in special purpose devices

2. What is the relation between triads and shadow mask method?

Answer: Page no : 29

Shadow mask methods can display a wide range of colors. In this technique each pixel position is made up of three phosphor dots called triads.

3. Discuss in brief the pixel drawing methods.

Answer: Page no : 48

BIOS routines are standard routines built in VGA cards but these routines are very much slow. You will use pixel to draw filled triangle, rectangles and circles and these all will be much slower than direct memory access method. Direct memory access method allows you to write pixel directly by passing the complex BIOS routines. It is easy and faster but its programming is only convenient in mode 13h. Library functions are easier to use and even faster because these are optimized and provided with special drivers by different companies.

4. What are the steps involved in performing the boundary fill algorithm, also write the pseudo code for the steps you have mentioned above?

Answer: Page no : 97

The Boundary fill algorithm performs the following steps:

Check the pixel for boundary color

Check the pixel for fill color

Set the pixel in fill color

Run the process for neighbors

The pseudo code for Boundary fill algorithm can be written as:

boundaryFill (x, y, fillColor, boundaryColor)

if ((x < 0) || (x >= width))

return

if ((y < 0) || (y >= height))

return

current = GetPixel(x, y)

if ((current != boundaryColor) && (current != fillColor))

setPixel(fillColor, x, y)

boundaryFill (x+1, y, fillColor, boundaryColor)

boundaryFill (x, y+1, fillColor, boundaryColor)

boundaryFill (x-1, y, fillColor, boundaryColor)

boundaryFill (x, y-1, fillColor, boundaryColor)

5. How the locality of a point can be defined with respect to a plane?

Answer: page no 208)(lec no 21)

One of the most important operations planes let you perform is defining the location of a point with respect to a plane. If you drop a point into the equation, it can be classified into three cases: in front of the plane, in back of the plane, or coplanar with the plane. Front is defined as the side of the plane the normal sticks out of.

6. Find in which quadrant the point (-2, 3) lies in 2D plane.

Answer:

2nd quadrant

7. Consider these 3-D vectors:

A = [9,8,7]

B = [4,7,3]

C = [2,9,6]

Compute :

i) A.BxC

ii) AxB.C

Answer:

BxC =[7x6 - 3x9 , 3x2 - 4x6 , 4x9 – 7x2]

=[15,-18,22]

A.BxC =9x15 +8x(-18)+7x22= 135-144+154=145

AxB =[8x3 - 7x7 , 7x4 - 9x3 , 9x7 – 8x4]

=[-25,1,31]

AxB.C =-25x2+1x9+31x6 = -50 + 9+186=145

8. What is the main difference between

i) Orthographic projection

ii) Oblique projection

Answer:

Orthographic Projection

If the direction of projection is perpendicular to the projection plane then it is an orthographic projection.

Oblique Projection

If the direction of projection is not perpendicular to the projection plane then it is an oblique projection.

9. a) Suppose we want to perform 3D scaling using homogenous coordinates with respect to a point Q (x1,y1,z1) Derive the matrix we should use for this purpose. Take (Sx = 6, Sy = 4 , Sz = 7)

b) Suppose we want to perform 3D Rotation of 180 degrees about Y-Axis using Homogenous coordinates using Reflection, Give the matrix that can do this task.

Answer:

Scaling with respect to a selected fixed position:

Scaling with respect to a selected fixed position (x1,y1,z1) can be represented with the following transformation sequence:

1. Translate the fixed point to the origin.

2. Scale the object relative to the coordinate origin

3. Translate the fixed point back to its original position

The reflection transformation operation is equivalent to rotation of 180 degrees so we can use the following transformation matrix using homogenous coordinates to perform the rotation of 180 degrees about y axis

10. Suppose we want to perform the following operations in 2D using homogenous coordinates in the order as given below:

a. Reflection about Y axis

b. Rotation of + 30 Degrees

c. Reflection about X axis

Find the resultant composite matrix that can perform this task using the individual 2D transformation matrices using Homogenous coordinates.

You can use the table:

11. Why is the Bresenham's line drawing algorithm more efficient than the DDA line drawing algorithm? Give precise one line answer.

Answer: lec no 5 and page no 57

Right Handed Rule:

Answer:

"Right Hand Rule" for rotations: grasp axis with right hand with thumb oriented in positive direction, fingers will then curl in direction of positive rotation for that axis. Right handed Cartesian coordinate system describes the relationship of the X, Y, and Z in the following manner:

X is positive to the right of the origin, and negative to the left.

• Y is positive above the origin, and negative below it.

• Z is negative beyond the origin, and positive behind it.

12. What is Viewing Frustum?

Answer:. Pge 199 and lec no 20

A viewing frustum is 3-D volume in a scene positioned relative to the view port's camera. The shape of the volume affects how models are projected from camera space onto the screen. The most common type of projection, a perspective projection, is responsible for making objects near the camera appear bigger than objects in the distance. For perspective viewing, the viewing frustum can be visualized as a pyramid, with the camera positioned at the tip. This pyramid is intersected by a front and back clipping plane. The volume within the pyramid between the front and back clipping planes is the viewing frustum. Objects are visible only when they are in this volume

13. Give homogeneous translation matrix for 2D transformation.

Answer: Page 118 and lec 12.

Translation with Homogeneous Coordinates
The translation can now be expressed using homogeneous coordinates as:

14. What is meant by Trivial Accept?

Answer:

Trivial Accept - save a line with both endpoints inside all clipping boundaries.

15. What is Rendering?

Answer: Page : 162 lec 16

The process of computing a two dimensional image using a combination of a three-dimensional database, scene characteristics, and viewing transformations. Various algorithms can be employed for rendering, depending on the needs of the application.

16. Write the two techniques of triangle rasterization. 2 marks

Answer:

1. Smooth Shaded Triangle Rasterization
2. Texture Mapped Triangle Rasterization