Questions on GVC Lectures 12 TO 15 (Finite Time Assessment)
Lectures: 12, 13, 14, and 15

On the Top margin of each paper Students should write their
i) Roll No, ii) Name and iii) Signature.
iv) Question No on the Left Margin.
*These pages should be scanned in order and uploaded preferably as a single PDF file. Please install Adobe Scan to take the pictures of your answer pages for uploading it (Preferably in PDF). **Do not Scan at high resolution so that the file size is large and it becomes difficult to upload it from your end.***

Do not share your login and password of your IITA e-mail. Any Malpractice of uploading through a single IP no, Uploading someone else's answer Sheet IS A CRIME. THE STUDENT will automatically fail the course.

These are difficult times. Your sincerity towards learning and ethical practice is expected from all of you.

[Marks: 40X1=40.
There will be marking the answer should be at least 75% correct to obtain 1 otherwise the marking will be 0.
   I.   *Those who submit with 1st ½ hour will get bonus 5 marks]*
   II.   *Those who submit within ½ to 1 hour will get bonus 3 marks*
   III.   *Those who submit within 1 to 1-½ hour will get bonus 2 marks*
   IV.   *Those who submit late by 1 hour, -1 marks.*
   V.   *Those who submit late by n hour, -n marks (Negative marks will be reset to 0).*
If a student has gone through my lectures and read the book he will surely get the bonus marks while the student who has not done any effort will find it difficult to reply within the time frame.


1. What is a convex polygon? Concave polygon? Intersecting polygons? Polygon with a hole? Draw.

2. How is a Polygon determined as convex (Methode 1)?

3. How is a Polygon determined as convex (Methode 2 different form 1)?

4. Why polygons are used for surface representation?

5. What is the need of "two vertices consideration" in the Scan Line algorithm? What is the major challenge of the "two vertices consideration" and how to tackle it?

6. Show that $x_k = x_0 + (k/m)$ in the Scan Line algorithm where x_0 and x_k represent the initial and k^{th} intersection points of the scan line and m is the slope.

7. Show the data structure of this polygon corresponding to the Scan line algorithm. for the figure:
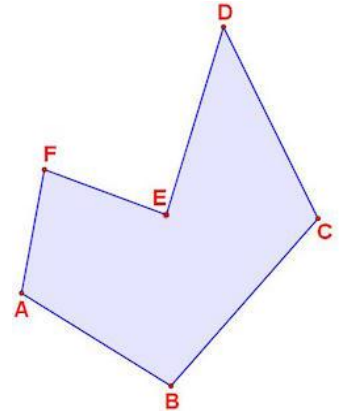

8. Explain 4 point and 8 point algorithms with appropriate examples.

9. When does the 4 point algorithm fail and you will require an 8 point algorithm?

10. What is the difference between Boundary Fill and Flood Fill Algorithms?

11. Draw the bi-level bitmap pattern of character 'Z'.

12. What are the possible outcomes when you clip a triangle?

13. Give an example of Sutherland-Hodgman Polygon clipping algorithm returning "no output".

14. Explain "point-to-plane" test.

15. What is the Sutherland-Hodgman Polygon clipping algorithm?

16. Why should we clip the polygon to the display window?

17.
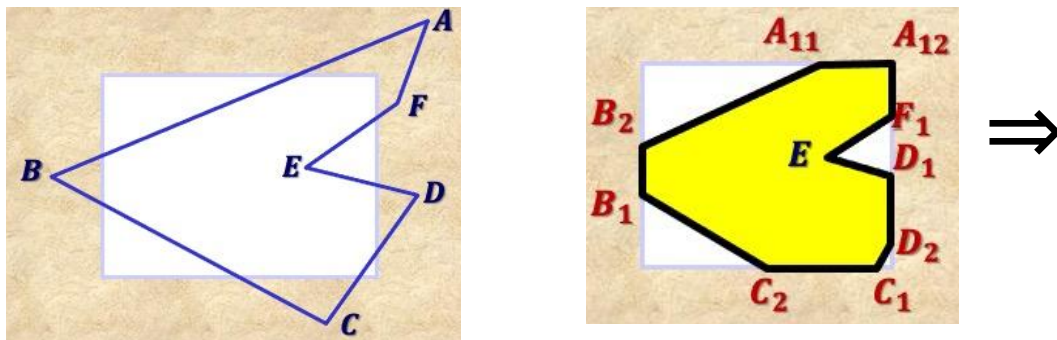
Input: link list of the polygon vertices in order
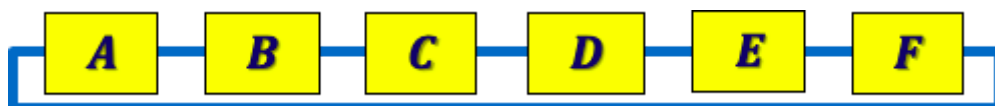
Start clipping the polygone from the right edge and move clockwise: (Right→ Bottom→ Left→ Top). Show how the link-list is modified with each edge clipping leading to the final clipped polygon:
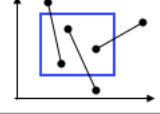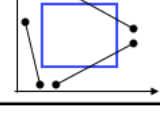
18. Examine the end-points of each line to see if they are in the window or not. Why if both end-points are outside the window, the solution is "Don't Know!"

19. How is the position of the vertices remembered in Cohen - Sutherland Line Clipping Algorithm?

20. How does the clipping algorithm know when a line segment should be accepted or summarily rejected in Cohen-Sutherland Line Clipping Algorithm?

Situation	Solution	Example
Both end-points inside the window	Don't clip	
One end-point inside the window, one outside	Must clip	
Both end-points outside the window	Don't know!	

21. How is partitioning different in Nicholl-Lee-Nicholl (or NLN) Line Clipping algorithm to Cohen-Sutherland Line Clipping Algorithm? And why is it considered faster in 2D clipping?

22. How is the front/back surface determined using the normal to the surface?

23. What are the 3 reasons that scene primitives can be invisible?

24. Describe the implementation of Z-buffering.

25. What is Z-buffering in contrast to Ray casting?

26. How is BSP Tree partitioning of space made into front and back nodes?

27. What are the 4 steps of Warnock's Algorithm: (An Elegant hybrid of Object-space and Image-space)?

28. Mathematically explain point clipping for 2-dimensional and 3-dimensional view.

29. Draw and explain the different scenarios and their respective solutions while line clipping.

30. Explain brute force line clipping . What is its major drawback?

31. Find the point of intersection (x', y') if the coordinate of C is (4,1), X is (5,10) and Y is
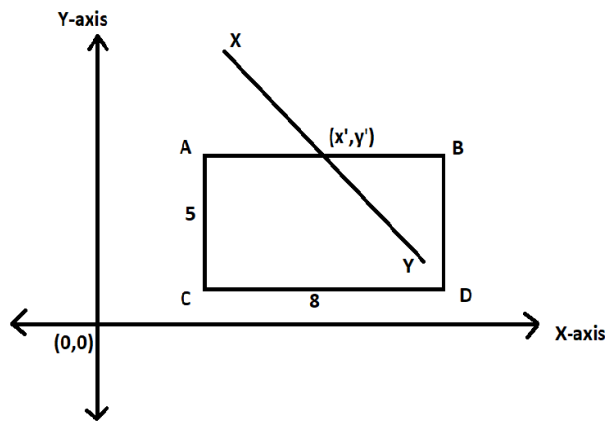

(11.5,2).

32. How many mathematical operations do we have to perform in total for brute force line clipping if we have a rectangular window and 3 edges?

33. Discuss the advantages and disadvantages of Z-buffering.

34. Give some examples of classification techniques used in hidden surface removal algorithms.

35. What are the procedures followed in object space and image space of hidden surface removal algorithm?

36. Convert this concave polygon (in the figure) into minimum possible convex polygons and mention the data structures.
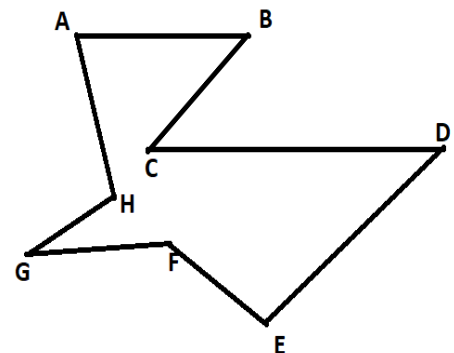
37. At a certain point X(2,3) the depth is found to be 5. Then what will be the depth at a point Y(7,3)?

38. Warnock's Algorithm is an elegant hybrid of object-space and image-space. Uses a standard graphics solution:- if the situation is too complex then subdivide the problem. explain the algorithm in 4 points starting from the root window:

39. Describe the **Painter's Algorithm:**

40. Which Triangle is on TOP? How can Painter's algorithm be implemented in such a situation?