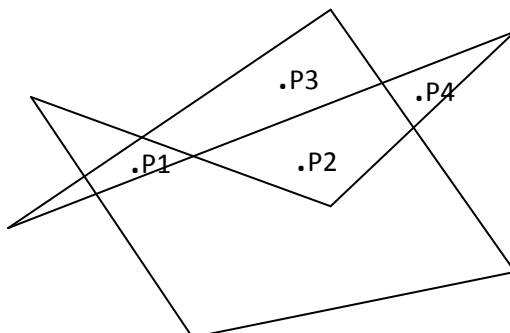


**Department of Higher Education**  
**University of Computer Studies, Yangon**  
**Fourth Year (B.C.Sc.)**  
**Final Examination**  
**Computer Graphics (CS-406)**  
**October, 2018**

Answer **ALL** questions.

Time allowed : 3 hours.

1. Explain **Any Five** of the followings: (10 marks)
- |                            |                 |
|----------------------------|-----------------|
| (a) Virtual reality system | (b) Resolution  |
| (c) Odd-even rule          | (d) Pixel mask  |
| (e) Reflection             | (f) Region code |
2. (a) What are the applications area of computer graphics?  
(b) Define direct view storage tube(DVST). Explain advantages and disadvantage of it.  
(c) Consider a raster system with resolution of 2560 by 2048 pixels. What size frame buffer (in bytes) is needed for each of these systems to store 12 bit per pixel? How much storage is required if 24 bits per pixel are to be stored? (15 marks)
3. (a) Difference between raster and random scan display.  
(b) Consider a raster system with resolutions of 2560 by 2048 and a display controller that refreshes the screen at a rate of 50 frames per second and the horizontal retrace time is 6 microseconds and vertical retrace time is 600 microseconds.  
(i) How many pixels could be accessed per second?  
(ii) What is the access time per pixel?  
(iii) What is the access time per frame without the retrace time?  
(c) What is the rate of a 1024 x 1024 frame buffer with an average access rate per pixel of 200 nanoseconds on a simple color display? (15 marks)
4. (a) Define circle function to apply the mid-point circle algorithm. How can we determine the position of any point(x, y) is inside or outside or on the boundary of the circle?  
(b) Determine successive pixel positions along the line path and decision parameters to digitize the line with end points (10, 10) and (20, 15) using Bresenham's Line Drawing Algorithm.  
(c) By using even-odd rule and non-zero winding number rule, state whether the given points p1, p2, p3 and p4 in the following figure are interior or exterior. (15 marks)



5. (a) Explain about the shape of the line ends to give a better appearance adding line caps.
- (b) Consider an RGB raster system that has a 512-by-512 frame buffer with 16 bits per pixel and a color lookup table with 24 bits per pixel.
- (i) How many distinct colors (including gray levels) can be displayed?
  - (ii) How many different colors can be displayed at any one time?
  - (iii) What is the smallest possible size (in byte) for the frame buffer?
  - (iv) What is the total memory size?
  - (v) How much would be required to store a frame buffer that provides 24 bit color directly?
- (15 marks)
6. (a) Explain how simple transformation is carried out by raster systems.
- (b) Prove that a uniform scaling ( $s_x = s_y$ ) and a rotation form a commutative pair of operations but that, in general, scaling and rotation are not commutative operations.
- (c) Determine the form of the transformation **sequence** for a reflection about an arbitrary line with equation  $y = m x + b$ .
- (15 marks)
7. (a) Describe the four stages of the Sutherland-Hodgeman clipping algorithm as the polygon is clipped by the left, right, top and bottom clipping planes.
- (b) Let R be the rectangular clipping window whose lower left-hand corner is (50, 10) and upper right-hand corner is at R(80, 40). Find the region codes for the endpoints point A(50, 50) and B(100, 15). Use the Cohen-Sutherland clipping algorithm to clip the line AB.
- (15 marks)

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