## Mid Semester Examination, Spring-2022

Full marks: **30** Exam duration: **2 Hours** 

Answer **all** questions. Figures next to each question in square bracket indicate marks. All Parts of a question should be answered at one place.

This question paper contains TWO page.

- Consider a raster display system of 1280 × 1024 resolution. It has a refresh rate of 60 frames per second. Compute the time required to scan across each row of pixel while refreshing.
- 2. Consider a raster screen of 8 inch width and 10 inch height. There are 150 pixels/inch and 100 pixels/inch along the horizontal and vertical directions respectively. What is the aspect ratio? [2]
- 3. Consider an RGB raster screen of 8 inch width and 10 inch height. In each direction it has a resolution of 100 pixels per inch. It consumes 5 bits per pixel in the frame buffer. Compute the minimum size (in bytes) of the frame buffer? [2]
- 4. An Ultra HD-High Dynamic Range (HDR)-Android TV has a screen size of 163.9cm and a display resolution of  $3840 \times 2160$  pixels. Pixels Per Inch (PPI) is a measure of pixel density or spatial resolution for different display devices. Determine the pixel density. [2]
- 5. A unit square is transformed by a transformation matrix of size  $2 \times 2$  resulting in the position vectors  $\begin{pmatrix} 0 & 4 & 12 & 8 \\ 0 & 4 & 4 & 0 \end{pmatrix}$ , where each column represents the  $\begin{pmatrix} x \\ y \end{pmatrix}$  coordinates. Deduce the transformation matrix.
- 6. Consider a square centred at (p,q) on a two-dimensional plane. It is subjected to a transformation that reduced the square to half of its original size, but the centre remained unchanged. Deduce the transformation matrix. [5]
- 7. The Queen of Hearts in Figure 1 (in next page) is transformed to five different images as shown in Figure 2. Deduce the transformation matrix for each of them. [5]
- 8. Use midpoint method to derive the decision parameters to draw the outline of an arc of radius r, beginning angle  $\alpha$ , and sweep angle  $\beta$ . Explain your designed algorithm with suitable examples. [7]

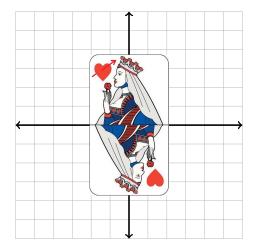


Figure 1: Input Image

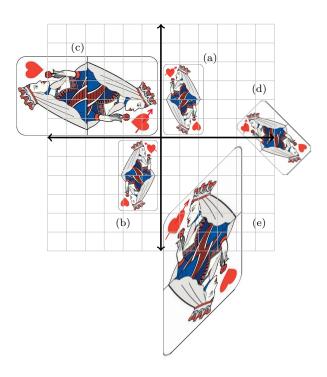


Figure 2: Output Images