Tutorial

1. Consider three different raster systems with resolutions of 640 by 480, 1280 by 1024 and 2560 by 2048. What size frame buffer is needed for each of these systems to store 12 bits per pixel? How much storage is required for each system if 24 bits per pixel are to be stored?

2. Suppose an RGB raster system is to be designed using an 8 inches by 10 inches screen with a resolution of 100 pixels per inch in each direction. If we want to store 6 bits per pixel in the frame buffer, how much storage do we need for the frame buffer?

3. How long will it take to load a 640 by 480 frame buffer with 12 bits per pixel, if 10^5 bits can be transferred per second? How long will it take to load a 24 bit per pixel frame buffer with a resolution of 1280 by 1024 using this same transfer rate?

4. We have a computer with 32 bits per word and transfer rate of 1 mips (million instructions per second). How long will it take to fill frame buffer of 300 dpi per inch laser printer with page size of 8.5 inches by 11 inches?

5. Consider two raster systems with resolution of 640 by 480 and 1280 by 1024. How many pixels could be accessed per second in each of these systems by a display controller that refreshes the screen at a rate of 60 frames per second? What is the access time per pixel in each system?

6. Suppose we have a video monitor with a display area that measures 12 inches across and 9.6 inches high. If the resolution is 1280 by 1024 and the aspect ratio is 1, what is the diameter of the each screen point?

7. How much time is spent scanning across each row of pixels during screen refresh on a raster system with a resolution of 1280 by 1024 and a refresh rate of 60 frames per second.

8. Consider a non interlaced raster monitor with a resolution of n by m (m scan lines and n pixels per scan line) a refresh rate of r frames per second, a horizontal retrace time of t_{horiz} And a vertical retrace time of t_{vert}. What is the fraction of the total refresh time per frame spent in retrace of the electron beam?

9. What is the fraction of the total refresh time per frame spent in retrace of the electron beam for a non interlaced raster system with a resolution of 1280 by 1024 a refresh rate of 60 Hz, a horizontal retrace time of 5 microseconds, and a vertical retrace time of 500 microseconds.

10. Assuming that a certain full color RGB raster system has a 512 by 512 frame buffer, how many distinct color choices would we have available? How many different colors could we display at one time?

11. Suppose you have a system with 8 inch by 10 inch video monitor that can display 100 pixels per inch. If memory is organized in one byte words, the starting frame buffer address is 0, and each pixel is assigned one byte of storage, what is the frame buffer address of the pixel with screen coordinates (x,y).

12. Consider a RGB raster system that has a 512 X 512 frame buffer with 20 bits per pixel and a color lookup table with 24 bits per pixel. How many distinct gray levels can be displayed with this system How many distinct colors can be displayed How many colors can be displayed at any one time What is the total memory size Explain two methods for reducing memory size while maintaining the same color capabilities.

13. Prove that scaling and rotation are not commutative.