Computer Graphic

Assignment 01

2-5 suppose an RGB raster system is to be designed using an 8-inch by 10-inch 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 (in bytes) do we need for the frame buffer?

The size of frame buffer is (8 x 10 x 100 x 100 x 6)/ 8= 600000bytes

2-6 how long would it take to load a 640 by 480 frame buffer with 12 bits per pixel, if 105bits can be transferred per second? How long would it take to load a 24-bit per pixel frame buffer with a resolution of 1280 by 1024 using this same transfer rate?

Total number of bits for the frame = 640 x 480 x 12 bits = 3686400 bits

The time needed to load the frame buffer = 3686400 / 10^5 sec = 36.864 sec

Total number of bits for the frame = 1280 x 1024 x 24 bits = 31457280 bits

The time needed to load the frame buffer = 31457280 / 10^5 sec = 314.5728 sec

2-8 consider two raster systems with resolutions 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?

The access time per pixel is 1 / (640x480x60)sec

The access time per pixel is 1 / (1280x1024x60)sec

※accurate time (1/60 – 639 x T_{horiz} – T_{vert})/640x480 sec

2-12 what is the fraction of the total refresh time per frame spent in retrace of the

electron beam for a noninterlaced 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?

1sec = 10^6 usec

Refresh rate = 60Hz = 1/60 sec to scan = 16.7 msec

The time for horizontal retrace = 1024 x 5 usec

The time for vertical retrace = 500 usec

Total time spent for retrace = 5120 + 500 = 5620 usec = 5.62 msec

The fraction of the total refresh time frame spent in retrace = 5.62 / 16.7 = 0.337

2-13 Assuming that a certain full-color (24-bit per pixel) RGB raster system has a 512-by-512 frame buffer, how many distinct color choices (intensity levels) would we have available? How many different colors could we display at any one time?

Total number of distinct color available is 2^{24}

Total number of colors we could display at one time is 512 x 512

2 Assuming that a certain RGB raster system has 512*512 frame buffer with 12 bit per pixel and color lookup table with 24 bit for each entry

1 How many distinct color choice we have available

2 How many different color could we display at any one time?

3 How much storage spent altogether for the frame buffer and the color lookup table?

Total number of distinct color available is 2^{24}

Total number of different color could display at any one time is 2^{12}

The storage spent for frame buffer is 512 X 512 X 12 bit = 3145728 bit

The storage spent for the color lookup table is 2^{12} X 24 bit = 98304 bit

So the total storage spent altogether is 3145728 + 98304 = 3244032 bit