Solutions for "End of Ch #10 Exercises"

10.3

a. There are 1,100 (sectors) ´ 40,000 (cylinders) ´ 6 (surfaces) = 264,000,000 blocks on this disk. Thus, the total storage capacity of this disk is 264M ´ 0.5KB = 132GB.

10.4   a.   (BL2) It takes 110 msec. for the disk to make 1/2 revolution, or 220 msec. for a full revolution. Thus, the disk rotates at 1/0.220 revolutions/second or approximately 272 rpm.

Chapter 10 Calculation Exercises:

[1] For a display of 1920 pixels by 1080 pixels at 16 bits per pixel how much memory, in megabytes, is needed to store the image?

Sol: 1920 * 1080 = 2,073,600 pixels

2,073,600 pixels * 2bytes/pixel = 4,147,200 bytes

Convert to megabytes: 4,147,200 bytes (1 MB / 1048576 bytes) = 3.955MB

Where 1 MB = 2^20 B = 1,048,576

[2] What is the average rotational latency of a hard drive rotating at 7,200 RPM or 120 revolutions per second? (Give your answer in milliseconds)

$$\text{average latency time} = \frac{1}{2} \times \frac{1}{\text{rotation speed}}$$

Sol: Formula from text: average latency time = ---------- x ---------------------------

Change rotational speed to revolution per sec: 7200 rev/min x [1 min / 60 sec] = 120 rev/sec

$$\text{Average latency time} = \frac{1}{2} \times \frac{1}{120 \text{ rev/sec}} = 0.004167 \text{ sec or } 4.167 \text{ ms}$$

[3] What is the transfer time for a hard drive rotating at 7,200 RPM or 120 revolutions per second? Assume there are 30 sectors per track. (Give your answer in milliseconds)

Sol: From formula in text:
$$\text{Transfer time} = \frac{1}{\text{Number of sectors} \times \text{rotational speed}}$$

$$\text{Transfer time} = \frac{1}{30 \text{ sector/track}} \times \frac{1}{120 \text{ rev/sec}} = .000278 \text{ sec or } .278 \text{ ms}$$