

Name: _____

This is an open book, open notes quiz. Be sure to show your work in order to get full credit for the problem. When possible place your answers in the provided boxes. There are three questions for a total of 20 points on this quiz.

Problem 1 (10 points)

Consider an old-fashioned unzoned disk drive with the following characteristics:

- 1 GB total storage
- 4 surfaces
- 1024 cylinders
- no interleaving
- rotational speed of 3,000 rpm
- track-to-track seek time of 5 msec
- average seek time of 10 msec

Answer the following questions regarding this disk drive:

In these answers I assume “computer” units; that is, $1k = 2^{10}$, $1M = 2^{20}$, and $1G = 2^{30}$.

How many 512 byte sectors are on this drive? 1G/512 or 2M
How many total tracks are on this disk drive? 4*1024 or 4096
How many sectors are on each track? 2M/4096 or 2M/4k or 512
How many sectors are on each cylinder? 512*4 or 2k
How long, in msec, is required for one rotation? 1/(3000 pm) or 1min/3000 or 60sec/3000 or .05sec or 20msec
If an 8-Mbyte file is stored in consecutive sectors of this disk, what is the average time required to read the entire file. 8Mbytes will require 16k sectors 16k sectors requires 8 cylinders, if first sector starts a cylinder Reading an entire cylinder requires 4*20msec, if rotation delay is ignored Reading an entire cylinder requires 4*30msec, if average rotation delay is needed to read each track Seeking to the first cylinder requires 10msec Seeking to the next seven cylinders requires 5msec each Time is something like 8*120msec + 10msec + 7*5msec (~1sec) or maybe 8*80msec + 10msec + 7*5msec (~700msec)

Problem 2 (5 points)

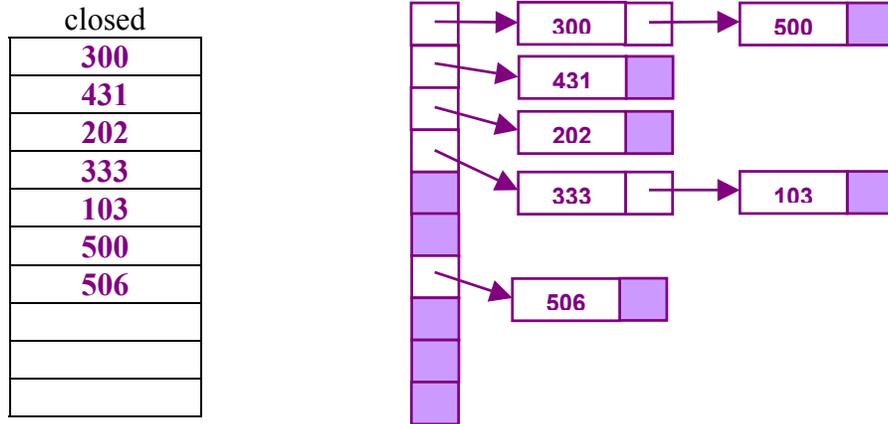
Suppose you are using hashing with a table of size 10 with the hash function:

$$H(x) = x \% 10$$

Show the result of adding the following seven records to the table using both closed and open hashing:

333, 431, 506, 103, 202, 300, 500

Assume you are using linear probing with the closed hash.



Problem 3 (5 points)

Suppose you are building skiplist that will also contain the seven values:

333, 431, 506, 103, 202, 300, 500

Assume that you allocate an extra pointer on heads (H) and that your coin tosses are:

H, T, T, T, H, T, T, H, T, H, H, T, H, T, T

[If you run out of tosses, just start again from the front.]

