COMP206   **Homework 5**   Assigned: December 3, 2003
Prof. Montek Singh   Due: December 10, 2003

Note: This homework assignment is in two parts, Part I and Part II. Part I consists of problems from the
textbook (Hennessy/Patterson 3rd ed., or "HP3") whose solutions appear at the end of the book. These
problems are for self-study only, and will not be graded, and therefore need not be submitted as part of your
written work. Part II consists of problems that will count towards your grade for this homework.

Part I (not graded):

1. **Unfair Benchmarks.**   Do HP3 Problem 5.1

2. **Cache Block Size and Prefetching.**   Do HP3 Problem 5.16.

3. **Loop-Carried Dependences.**   Do HP3 Problem 4.5.

4. **Single Disk vs. Striped Array.**   Do HP3 Problem 7.8.

Part II (to be graded):

1. **(15 points) Virtual Memory.**   Do HP3 Problem 5.18, *part (b) only.*

2. **(25 points) Storage Systems.**

   Suppose you were given eight identical disks and were asked to set them up in a RAID configuration.
   Further suppose that you could only choose between two RAID configurations: *mirrored stripes* (RAID
   0+1) or *striped mirros* (RAID 1+0).

   (a) Draw pictures illustrating the two configurations, and identify which is which. Hint: See lecture
       notes for an illustration of one of the configurations.

   (b) If the probability of a given disk failing on any given day is p (and is independent of other disks),
       calculate for each of the two configurations the probability of failure of the storage system on a
       given day, as a function of p.

   (c) If your primary objective was achieving reliable storage, which of the two configurations would
       you choose, and why? (1-2 sentences)

   (d) If your primary objective was achieving high data transfer rates, which of the two configurations
       would you choose, and why? (2-3 sentences)