CMU 18-746	**Storage Systems**	**Assigned: 29 Aug 2006**
Fall 2006	**Homework 0**	**Due: 5 Sept 2006**

Solutions are due at the beginning of class on the due date and must be **typed** and neatly organized. Late homeworks will not be accepted. You are permitted to discuss these problems with your classmates; however, your work and answers must be your own. All questions should be directed to the teaching assistant.

Our intent with this homework is to get you thinking about storage-related topics from your previous courses. We are looking for three- to five-sentence answers, not essays. Your answers should be long enough to convince us that you understand the topic.

Problem 1 : Personal information.

(a) What are your reasons for taking this course? Which of the topics especially interest you?

(b) What do you expect to get out of this course?

Problem 2 : Locality of reference.

Define *spatial locality* and *temporal locality* in the context of a file system's buffer cache.

Problem 3 : Virtual memory.

(a) What is *swapping* and when does it occur?

(b) What is a *page fault*? List the steps involved in handling a page fault.

Problem 4 : Polling and interrupts.

Define *polling* and *interrupt-driven notification* in the context of I/O devices. Give one advantage of each approach.

Problem 5 : Application I/O.

(a) Explain the difference between an *I/O-bound process* and a *CPU-bound process*.

(b) Explain the difference between *blocking I/O* and *non-blocking I/O*.

Problem 6 : Programmed I/O and DMA.

(a) What is *DMA*? What is *Programmed I/O*?

(b) Give an example of a device in a typical computer system that uses DMA, and a device that uses Programmed I/O. In general, when is it better to use DMA?

Problem 7 : Communications networks.

(a) Define *latency* and *bandwidth* in the context of the World Wide Web.

(b) Explain what a *Hamming code* is. How does the use of Hamming codes differ from parity-based error detection?