

2 problems. 40 points. 30 minutes *Closed book. Closed notes. No electronic device.* *Write your name above.*

Recall: ToyOS has a request handler (`ioReqHndlr`) and possibly an interrupt handler (`ioIntHndlr`) for each io device. These handlers make use of functions `updateRunqPcb`, `scheduler`, `wakeup`, `wait`, among others. OS-IO interaction can have various *features*: program-driven, interrupt-driven, synchronous, asynchronous, dma, etc.

1. [20 points]

Consider an output device X as follows: (1) data block size is 2 memory words (e.g., 64 bits); (2) time to output a data block (i.e., from adaptor to device) is the time that the cpu takes to execute about 10 machine instructions.

Part a. Which features would you choose for OS- X interaction. Explain briefly.

Part b. Write down the request handler and the interrupt handler (if any) for X , consistent with your part a answer. You should use a similar level of detail as in ToyOS.

2. [20 points] Repeat problem 1 but with device X replaced by a keyboard. (So your answer has part a and part b.)