Last Time

- Interrupts:
  - A means for temporarily stopping the execution of the main program to execute another small piece of code
  - In response to some event (either external from or internal to the chip)
- Timer/counters and regular interrupts

(no interrupts on the midterm)

Today

- Midterm review
- Homework 3 (due right now)

- Project 3 due Thursday after break (don’t wait!)

Midterm Preparation

- Exam discussion on D2L
  - Post sample questions (and answers)
  - Some may appear on the exam
- Look to homework assignments and exams from last year (both the midterm and final) for the types of questions

Midterm Exam

- No books
- No electronic devices
- You may bring 1 page of **your own** notes
  - Double-sided
- Assigned seating

Digital Logic

- Basic gates
  - Truth table
  - Symbols used in circuit diagrams
  - NOT, AND, OR, NAND, NOR, XOR
  - Tristate buffers
- Boolean algebra
  - Notation
  - Precedence
  - Basic laws: associative, distributive, commutative
  - Demorgan’s laws
  - Basic identities

Digital Logic

- Digital circuits
  - Cascading basic gates
  - Truth table to algebraic representation to circuit design
  - Multiplexers, demultiplexers
- Circuit reduction
  - Algebraic manipulation

Number Representations

- Conversion between binary and:
  - Decimal
  - Hexidecimal
- Bit-wise operations

Arithmetic

- Adding/subtracting binary numbers
- Shifting left/right (multiplication/division by 2)

Sequential Logic

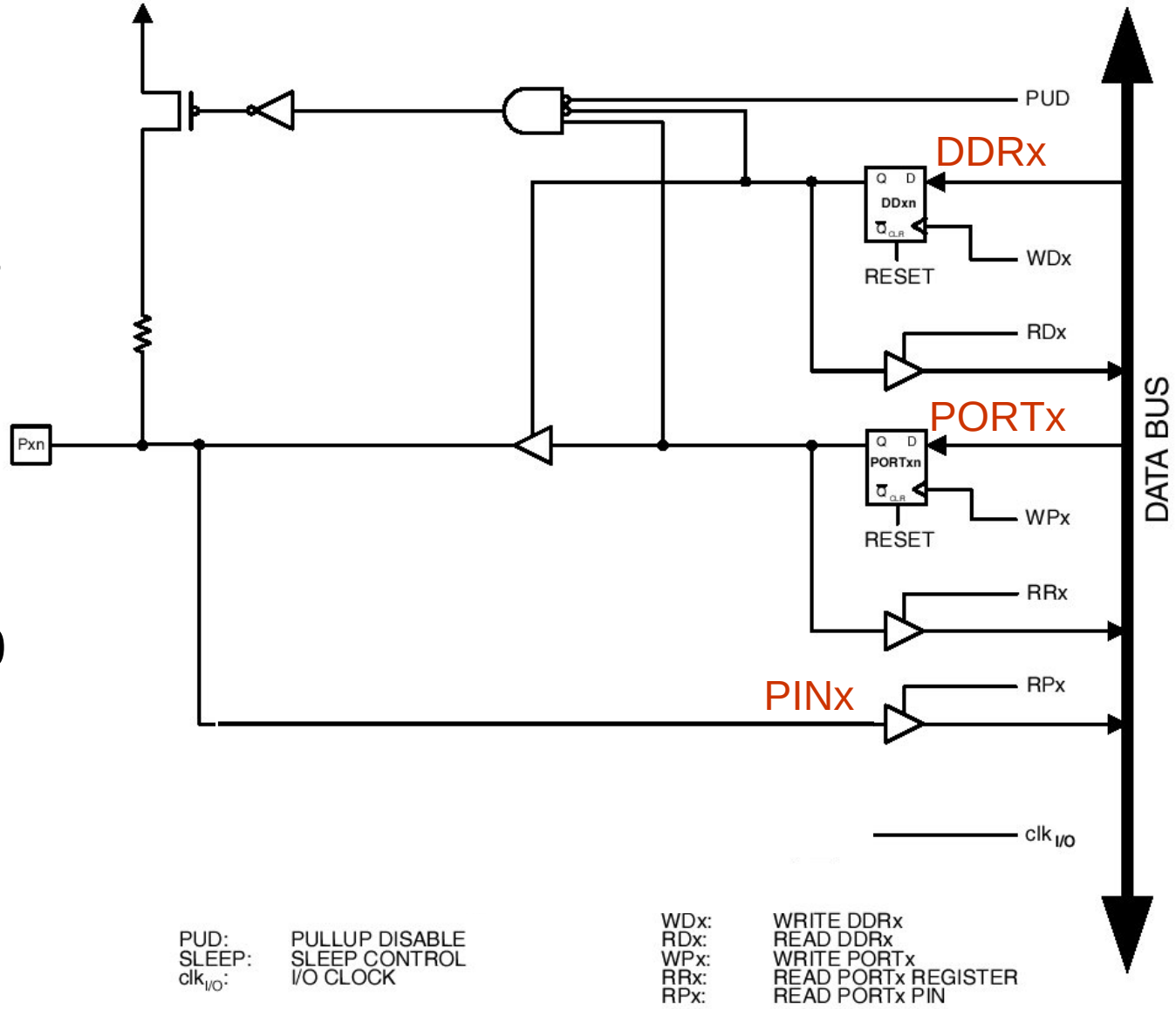
- Notation
  - Timing diagrams
- D flip flops
- Circuits with flip flops
  - Shifters
  - Counters
  - Memory
- Circuit analysis
  - How does the circuit behave?

Microprocessor Components

- Memory
- Registers:
  - General purpose
  - Special purpose, e.g.:
    - Program counter
    - Instruction register
- Instruction decoder
- Arithmetic logical unit
- Data bus

Microcontroller I/O

- Function of the primary components
  - DDRx
  - PORTx
  - PINx
- Relationship to C code



Memory

- Components and behavior
- Types of memory
- Memory elements
- Primary I/O lines
  - Address
  - Data
  - Chip select
  - R/W
  - Clock

Counter/Timers

(small question)

- How to generate an event that occurs N seconds into the future?
- How to measure the time from now until some event?

Counter/Timers

- Timer 0
  - 8-bit counter
  - Prescaler: 1, 8, 64, 256, 1024
- Timer 1:
  - 16-bit counter
  - Prescaler: same as timer 0
- Timer 2:
  - 8-bit counter
  - Prescaler: 1, 8, 32, 64, 128, 256, 1024

Interrupts

- None!

Next Time

- Continue with interrupts