MIDTERM 1

The midterm has not been written; however, I envision a mix of multiple choice (≈ 15), short answer, and Programming problems.

Material Covered in Midterm 1 (Lecture 01 to 08)

	Lecture	Worksheets
• Introduction to Assembly – Simple Programming	01	
• Introduction to Microcontrollers	02	
• AVR Peripherals – including AVR Studio and Simulation	*From lab material*	
• Load-Store Programming	03	Questions on Page 9, **Load-Store Worksheet**
• AVR ALU and SREG	04 and	Questions on Page 11 of lecture 04
• Bit and Bit-Test Instructions	*From lab material*	
• AVR Branching and Looping	05 and 06	**AVR Branching Solutions and AVR Looping Solutions**
• Quiz 1		**Quiz 1 Review** - Solutions
• AVR Subroutine Basics	07	
• ATmega GPIO	08 *and Lab material*	*Labs 1 and 2*
• Labs up to and including Lab 2		
•		**Practice Programming Problems**

Sample Topics

AVR Assembly: Number Systems, Instruction Types, MCU Instructions, AVR Assembly Files

AVR Microcontroller: Flip-flops and Registers, Microcontroller Architecture, CPU Operation, ISA Registers, Pipeline, Memory Mapped I/O

Load-Store Programming (plus Addressing Modes): Data Transfer Instructions, Addressing Modes, Data Transfer Instruction encoding.

ALU and SREG: ALU Instructions**,** SREG Bits

Bit and Bit-Test Instructions: Bit and Bit-Test Instructions, Lab

AVR Jumping, Branching, and Looping: Compare and Test Instructions, Control Transfer Instructions, Modification of ISA Registers, Instruction `call, rcall, jmp, rjmp` encoding, Implementation in assembly of high level programming control transfer and looping instructions, Software Timing Loops, Pipeline Operation

AVR Peripherals – including AVR Studio Assembly and Simulation: From Lab Material

You will be provided with the following

- Arduino Proto-Shield Schematic
- Four (4) pages from the ATmega328P Summary (Atmel Document 8161S)
  - ✓ Section 5. Register Summary Pages 10 and 11 (not 8 and 9)
  - ✓ Section 6. Instruction Set Summary Pages 12 and 13 (not 14)

You can bring …

1. One half (½) of front side of notes. See Syllabus for rules on what may and may not be on your sheet of notes.
2. 4-function calculator