EE 109 Final Review
# Final Jeopardy

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Binary Brainteaser 100

• Given the binary string “10001101”, what would its decimal equivalent be assuming a 2’s complement representation?

• ANSWER: -128+8+4+1 = -115
Binary Brainteaser 200

• Assuming the 12-bit IEEE shortened FP format, what is the decimal equivalent of the following number?

  1 10010 100010

• ANSWER: $-1.100010 \times 2^3 = -1100.010 = -12.25$
Binary Brainteaser 300

• Under what conditions does overflow occur in signed arithmetic (addition/subtraction)?

• ANSWER: when p+p=n or n+n=p
Binary Brainteaser 400

• Under what conditions does overflow occur in unsigned arithmetic (addition/subtraction)?

• ANSWER: If adding, when Cout=1, if subtracting, when Cout=0
Binary Brainteaser 500

• Given the following normalized FP number, what would the result be after using the round-to-nearest method?

  +1.011011 100 * 2^5

• ANSWER: Round to 0 in the LSB, so round up to +1.011100*2^5
Instruction Inquiry 100

• Initial conditions:
  – R[4] = 0x20
  – R[5] = 0x10010040
  – M[0x10010044] = 0xabcdef98
  – M[0x10010040] = 0x12345678
  – M[0x1001003c] = 0x11122233

• What is the result of the following instruction?
  – lb $6, 5($5)

• ANSWER: 0xffffffffef
Instruction Inquiry 200

• Initial conditions:
  – R[4] = 0x20
  – R[5] = 0x10010040
  – M[0x10010044] = 0xabcdef98
  – M[0x10010040] = 0x12345678
  – M[0x1001003c] = 0x11122233

• What is the result of the following instruction?
  – lw $6, 0xffffc($5)

• ANSWER: 0x11122233
Instruction Inquiry 300

• Initial conditions:
  – R[4] = 0x80010000
  – R[5] = 0x10010040
  – M[0x10010044] = 0xabcddef98
  – M[0x10010040] = 0x12345678
  – M[0x1001003c] = 0x11122233

• What is the result of the following instruction?
  – sra $6,$4,1

• ANSWER: 0xc0008000
Instruction Inquiry 400

• Initial conditions:
  – R[4] = 0x80010000
  – R[5] = 0x10010040
  – M[0x10010044] = 0xabcdef98
  – M[0x10010040] = 0x12345678
  – M[0x1001003c] = 0x11122233

• What is the result of the following instruction?
  – slt $6,$4,$5

• ANSWER: 0x1 (0x80010000 is neg. so it is less than $5)
Instruction Inquiry 500

• The pseudoinstruction ‘blt $4,$5,L1’ would appropriately be translated as:
  – slt $1,$4,$5
  – b___ $1,$0,L1

• ANSWER: bne
When checking the status of an I/O device one can rely on interrupts or __________?

ANSWER: Polling/Busy looping
Programming Pickles 200

• Calling a subroutine requires using the (jal / jr) instruction and will result in the return address being stored (in $ra / on the stack)?
The stack frame of a subroutine includes space for three sections of data, what are they?

**ANSWER:**

- Local variables
- Saved registers
- Arguments for subroutines
• System calls, interrupts, and error conditions cause breaks in normal program execution. What is the name we give to these events?
  • ANSWER: Exceptions
• What is the name we use for software routines associated with an interrupt or other error event?

• ANSWER: handler routines or ISRs