

The UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Comp 411 Computer Organization

Fall 2009

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Midterm #1: Sample Questions

(The actual exam will have 10-15 questions.)

1. How many bits does it take to encode a 9-digit social security number? Assume all possible combinations of digits are legal. Fractional bits should be rounded up. (If you do not have a calculator, you can give the full expression instead of the final answer.)
2. Using *6-bit 2's-complement* binary arithmetic, add the following two numbers: $(-5_{10}) + (-2_{10})$. Show all of the following steps: (i) computing the 2's complement representation of the two numbers, (ii) adding them together, and (iii) computing the sign and magnitude of the result in decimal.
3. Which field determines the operation of an R-type instruction?
4. Without making any assumptions about the contents of registers or memory, which of the following operations *cannot* be performed by a single MIPS instruction?
 - (A) $\text{Memory}[\text{R}[\text{rs}] + 0\text{x}1000] \leftarrow 0$
 - (B) $\text{Memory}[\text{R}[\text{rs}]] \leftarrow 0$
 - (C) $\text{Memory}[0\text{x}1000] \leftarrow 0$
 - (D) $\text{Memory}[\text{R}[\text{rs}] + \text{R}[\text{rt}]] \leftarrow 0$
 - (E) $\text{R}[\text{rt}] \leftarrow \text{Memory}[\text{R}[\text{rs}] + 0\text{x}1000]$
5. Which of the following statements about 2's-complement binary addition of two N-bit numbers is true?
 - (A) The sum will have at most N bits
 - (B) If the two numbers are positive, the result will never be negative
 - (C) There will always be at least one bit position that generates a carry
 - (E) None of the above