

**3.1** What is 5ED4 2 07A4 when these values represent unsigned 16-bit hexadecimal numbers? The result should be written in hexadecimal. Show your work.

- $5ED4 = (5 \times 16^3) + (14 \times 16^2) + (13 \times 16^1) + (4 \times 16^0) = 24,468$
- $207A4 = (2 \times 16^4) + (7 \times 16^3) + (10 \times 16^2) + (4 \times 16^1) = 133,636$
- $24,468 + 133,636 = 158,104$
- $158,104 = \underline{\mathbf{26E18}}$

**3.20** What decimal number does the bit pattern 0x0C000000 represent if it is a two's complement integer? An unsigned integer?

- $0x0C000000 = 1100\ 0000\ 0000\ 0000\ 0000\ 0000\ 0000\ 0000$
- Invert all bits:  $0011\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111$
- Add 1:  $0011\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1111 + 1$
- $= 0100\ 0000\ 0000\ 0000\ 0000\ 0000\ 0000\ 0000 = \underline{\mathbf{-1,073,741,824}}$
- Unsigned int:  $0x0C000000 = \underline{\mathbf{3,221,225,472}}$

**3.21** If the bit pattern 0x0C000000 is placed into the Instruction Register, what MIPS instruction will be executed?

- Opcode field is 0x0C  $\rightarrow$  **jal**

**3.22** What decimal number does the bit pattern 0x0C000000 represent if it is a floating point number? Use the IEEE 754 standard.

- $0x0C000000 = 1100\ 0000\ 0000\ 0000\ 0000\ 0000\ 0000\ 0000$
- Sign bit = 0  $\rightarrow$  positive number.
- Exponent =  $1000\ 0000 = 128 - 127$  (bias) = 1
- Fraction =  $000\ 0000\ 0000\ 0000\ 0000\ 0000$
- $(-1)^0 \times 1.000000000000000000000000 \times 2^1 = \underline{\mathbf{2}}$