ELEC 464 : MICROCOMPUTER SYSTEM DESIGN
FALL 1995

Assignment 1
Solutions

Question 1(a)

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*
* ELEC 464 Assignment 1 (a)
* Ed Casas, September 19, 1995
*
* This routine reverses the bits in D0.L (MS bit to LS bit).
* Result is returned in D0.L.  Destroys D1 and D2.
*
        ORG     $400

REVERSE:
        MOVE    #32,D1
D1 counts number of bits left to reverse
LOOP:   LSL.L   #1,D0   shift MS bit of source left to C and X
        ROXR.L  #1,D2   shift X right into destination
        SUB     #1,D1   decrement bit count
        BNE     LOOP    loop until all bits shifted
        MOVE.L  D2,D0   return result in d0
        RTS
```

Question 1(b)

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*
* ELEC 464 Assignment 1 (b)
* Ed Casas, September 11 1995
*
* This routine sorts a byte array pointed at by A2 with length
* given in D1 into into descending order. Destroys D1, D2, D3, A2
* and A3.
*
        ORG     $400

SORT    CMP.L   #1,D1    test number of bytes left to sort
        BLE     SORT2       and return if one or fewer

        MOVE.L  D1,D2    set bytes to test = number of bytes in array
        MOVEA.L A2,A3    set test byte = first byte in array

SORT0   MOVE.B  (A2),D3  get first element of array (largest so far)
        CMP.B   (A3),D3     compare ("subtract") test byte
        BCC     SORT1       if test byte is larger (C set) then
        MOVE.B  (A3),(A2)      swap first element and test element
        MOVE.B  D3,(A3)

SORT1   ADDQ.L  #1,A3    point to next test byte
        SUBQ.L  #1,D2    decrement count of bytes left to test
        BNE     SORT0    loop back if more elements to test

        ADDQ.L  #1,A2    increment array pointer to next element
        SUBQ.L  #1,D1    decrement size of array left to sort
        BRA     SORT     repeat the sort for the new array
SORT2   RTS
```