THE DUART

1. Explain why the output register of the DUART was designed with the separate OPR_SET and OPR_CLR instead of just one address that stores the output bits?

2. Write code to set bits 0-2 of the DUART output register to %101 without affecting bits 3-7.

3. Explain the difference between serial and parallel communication.

4. Suppose memory contains:
   $9000: 31 A0 73 82 BE FF 00
   Suppose D0 contains $1234 and A0 contains $9000.
   a. What are the contents of memory after the instruction MOVEP.W D0, 3(A0)
   b. What are the contents of D0 after the instruction MOVEP.L 0(A0), D0

POSITION-INDEPENDENT CODE

Read 2.4.10, 2.4.11, 4.8
Do Chapter 2 # 30df, 19

1. Why is it desirable to write position-independent code?

2. Compare JSR, BSR, and TRAP as methods to call a subroutine.
3. The code below reads hex characters from the keyboard and outputs to a 7
segment LED connected to the 68KMB output port. Find four places where the
code fails to be position independent and fix them.

```
DUART EQU $00C001 ;68681 base address
IPR EQU 13*2 ;input port register
OPR_SET EQU 14*2 ;set bit command reg.
OPR_CLR EQU 15*2 ;clear bit command reg.
ISHEX EQU $0009B2
ATOH EQU $000982

ORG $8000
LED7 MOVEA.L #DUART,A0 ;A0 points to 68681
LOOP TRAP #0 ;read key
BSR ISHEX ;is it a hex digit?
BCC LOOP ;no.. try again
JSR ATOH ;convert to nibble
JSR CONVERT ;convert to 7-seg code
BSR OUT681 ;update LEDs
JMP LOOP ;repeat

* convert a nibble to a 7-segment code *
CONVERT MOVE.L #TABLE,A1
MOVE.B (A1,D0),D0 ;table look-up
RTS

TABLE DC.B $7E,$30,$6D,$79,$33,$5B,$5F,$70 ;7 seg led
DC.B $7F,$73,$77,$1F,$4E,$3D,$4F,$47 ;patterns

* OUT681 - output data to 68681 output port
OUT681 SET.B OPR_CLR(A0) ;clear all bits
MOVE.B D0,OPR_SET(A0) ;set bits from D0
RTS
```