Problem 1:

Write an ARM7 assembly program that reads 3 numbers from the memory, adds them and stores the result back in the memory.

Solution:

```
        AREA addition, CODE, READWRITE
        ENTRY
        LDR R1, NUM1
        LDR R2, NUM2
        LDR R3, NUM3
        ADD     R4, R1, R2
        ADD     R5, R4, R3
        STR     R5, RES
NUM1 DCD     5
NUM2 DCD     3
NUM3 DCD     2
RES  DCD     0

        END
```

Problem 2:

Write an ARM7 assembly program that reads 2 numbers from the memory, finds the largest number and stores the largest in R5.

Solution:

```
        AREA numbers, DATA, READWRITE
NUM1 DCD 20
NUM2 DCD 30

        AREA largest, CODE, READWRITE
          ENTRY

          LDR R1, NUM1
          LDR R2, NUM2
          CMP R1, R2
          BGT ONE
          MOV R5, R2
          B EXT
ONE       MOV R5, R1
EXT
  END
```

Problem 3:

Write an ARM7 assembly program that sums up elements of an array that contains 8 elements then calculates the average and stores both the sum and average in the memory.

Solution:

```
        AREA array1, DATA, READWRITE
ARR     DCD 3,5,1,2,10,15,4,8
SUM     DCD 0
AVG     DCD 0

        AREA Sum, CODE, READWRITE
        ENTRY
        MOV R3,#0
        MOV R5, #0
        LDR R0,=ARR

LOP     CMP  R3, #8
        BEQ DONE
        LDR R1, [R0]
        ADD R5, R5, R1
        ADD     R0, R0, #4
        ADD R3, R3, #1
        B LOP

DONE    STR  R5, SUM
        MOV R6, R5,ASR #3
         STR R6, AVG
        END
```

Problem 4:

Write an ARM7 assembly program that after reading the elements of an array 0f 10 elements , gets the maximum and the minimum and stores them in registers R5, R6 respectively. Hint: Assume that initial value of maximum =0 and minimum =1000.

Solution:

```
        AREA array2, DATA, READWRITE
ARR     DCD 3,5,1,2,10,15,4,8,7,6

        AREA Sum, CODE, READWRITE
        ENTRY
        MOV R3,#0
        MOV R5,#0
        MOV R6,#1000
        LDR R0,=ARR

LOP     CMP  R3, #10
        BEQ EXT
        LDR R1, [R0]
        CMP R1, R5
        BGT MAX
        CMP R1, R6
        BLT MIN
        B CNT

MIN     MOV R6, R1
        B CNT

MAX     MOV R5, R1
CNT     ADD     R0, R0, #4
        ADD R3, R3, #1
        B LOP
EXT
```

Problem 5:

Write an ARM7 assembly program that after reading the elements of an array of 10 elements that contains negative, positive and zero numbers, counts the zeros and stores it in R7, and stores the negative numbers in another array.

Solution:

```
        AREA array3, DATA, READWRITE
ARR     DCD 3,-5,-1,0,10,0,4,-8,7,6
ARR2    DCD 0,0,0,0,0,0,0,0,0,0

        AREA Sum, CODE, READWRITE
        ENTRY
        MOV R3,#0
        MOV R7,#0
        LDR R0,=ARR
        LDR R2,=ARR2

LOP     CMP R3, #10
        BEQ EXT
        LDR R1, [R0]
        CMP R1, #0
        BEQ INC
        BLT NEG
        B CNT

INC     ADD R7, R7, #1
        B CNT

NEG     STR R1, [R2]
        ADD R2, R2, #4

CNT     ADD R0, R0, #4
        ADD R3, R3, #1
        B LOP
EXT
        END
```

Problem 6:

Write an ARM7 assembly program that given a hexadecimal number 0xAB5F, should swap the values of bits from 0 to bits 7 with bits 8 to 15, so that the value become 0x5FAB using logic operations. Any value needed in the problem must be read from the memory.

Solution:

```
        AREA swaphexa, CODE, READWRITE
        ENTRY
        LDR R1, Value
        LDR R2, MASK
        AND R3,R1, R2
        MOV R3,R3, LSL#8
        LDR R1, Value
        LDR R2, MASK2
        AND R4,R1, R2
        MOV R4, R4, LSR#8
        ORR R5, R3, R4
        STR R5, Value

Value  DCD 0xAB5F
MASK DCD 0x00FF
MASK2 DCD 0xFF00

        END
```