Problem 1:

Converts the following c-code to an ARM7 assembly language.

```
int a =5;
int b =6;
int max =0;
if (a<b)
        max = b;
else if (a>b)
        max = a;
else
        max =100;
```

Solution1

```
        AREA Maxi1,CODE
        ENTRY
        MOV R1, #10
        MOV R2, #6
        SUBS R5, R1, R2
        MOVGT R3,R1
        MOVLT R3,R2
        MOVEQ R3, #100
        END
```

Solution2

```
      AREA  Maxi2, CODE
      ENTRY
      MOV R0, #5 ; R0 => a
      MOV R1, #6 ; R1 => b
      MOV R3, #0 ; R3 => max

      CMP R0, R1
      BLT Maxib
      BGT Maxia
      MOV R3, #100
      B EXT

Maxib MOV R3, R1
      B EXT

Maxia MOV R3, R0
EXT
      END
```

Problem 2:

Write an ARM7 Assembly program that finds the maximum value within 3 values, given the following c-code.

```
int a =5;
int b =6;
int c =8;
int max =0;
if (a>b)
        if (a>c)
                max =a;
        else
                max = c;
else
        if (b>c)
                max = b;
        else
                max =c;
```

Solution:

```
      AREA max3, CODE
      ENTRY

      MOV R0, #5
      MOV R1, #6
      MOV R2, #8

      CMP R0, R1      ; if (a>b)
      BGT amax1
      CMP R1, R2       ; else if (b<c)
      BLT cmax         ;  go to max=c
      MOV R3, R1       ; max = b
      B EXT

amax1 CMP R0, R2   ; if (a>b) then if (a>c)
       BGT amax

cmax  MOV R3, R2       ; max = c
      B EXT

amax  MOV R3, R0       ; max = a

EXT
      END
```

Problem 3:

As there is no division instruction in ARM. To perform this operation we treat it as a successive subtraction as in the following example:

If we need to calculate 7/2 (which will be 3 and remainder 1), the initial dividend is 7 and we have to calculate both quotient and remainder. We can repeatedly subtract 2 (divisor) from current dividend until we reach some value less than current dividend which will be the remainder as following:

divisor	dividend	quotient
2	7	0
2	5	1
2	3	2
2	1	3

We must stop here because the divisor is less than the dividend and finally the quotient equals 3 and remainder is 1 (which is the last value of the dividend).

Write an ARM7 assembly program that performs a division between two operands and stores the quotient in register R3, and the remainder in register R4.

Solution:

```
      AREA  Division, CODE
      ENTRY
      MOV R0, #7 ; R0 => dividend
      MOV R1, #2 ; R1 => divisor
      MOV R3, #0 ; R3 => quotient
      MOV R4, #0 ; R4 => Remainder

Loop CMP R0, R1
      BLT Done   ; if R0 < R1 then stop
      SUB R0, R0, R1  ; R0 = R0 - R1
      ADD R3, R3, #1  ; R3 = R3 + 1
      B Loop

Done MOV R4, R0  ; Remainder contains last dividend value
     END
```