Assignment #3

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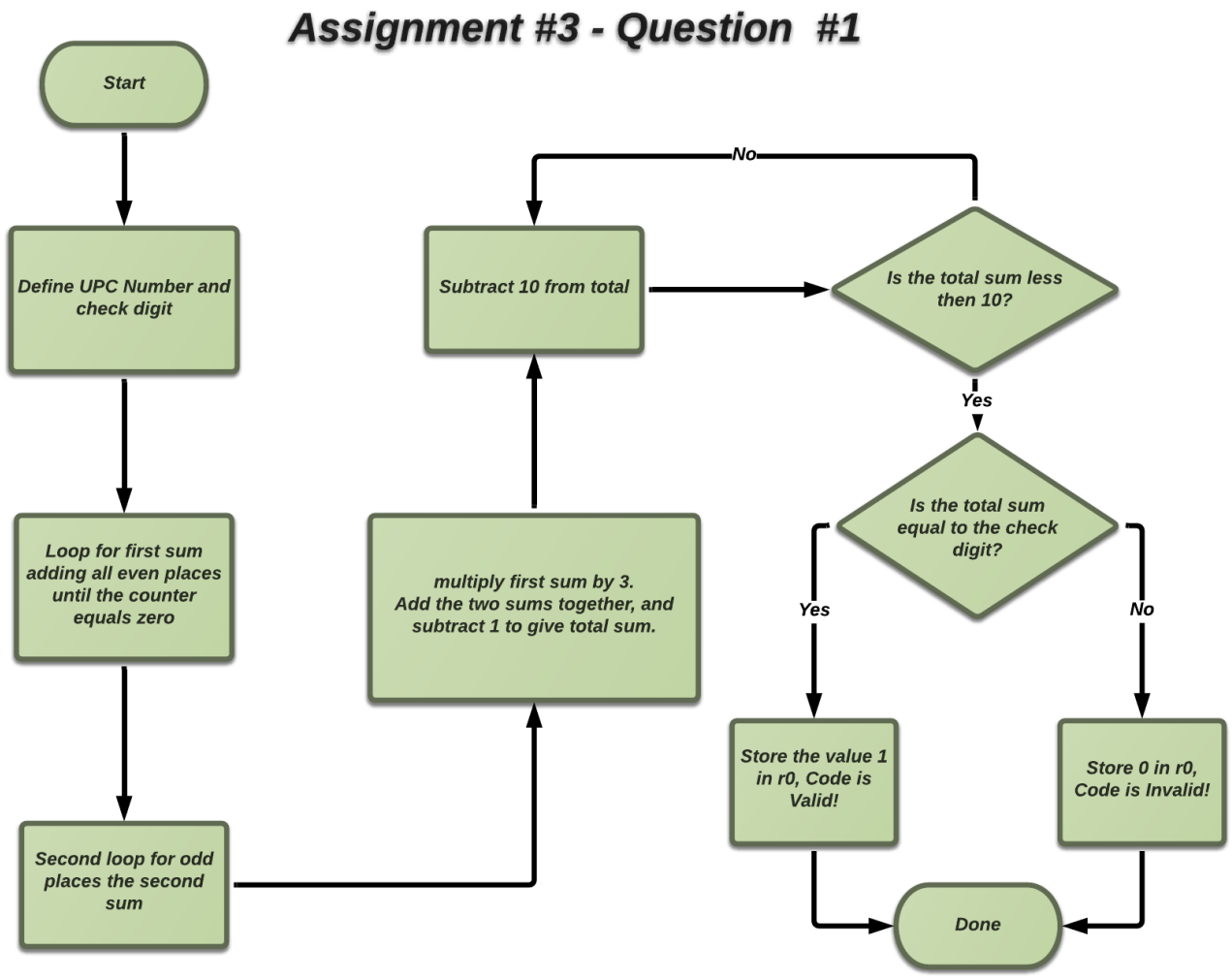
Question #1

Flow Chart:

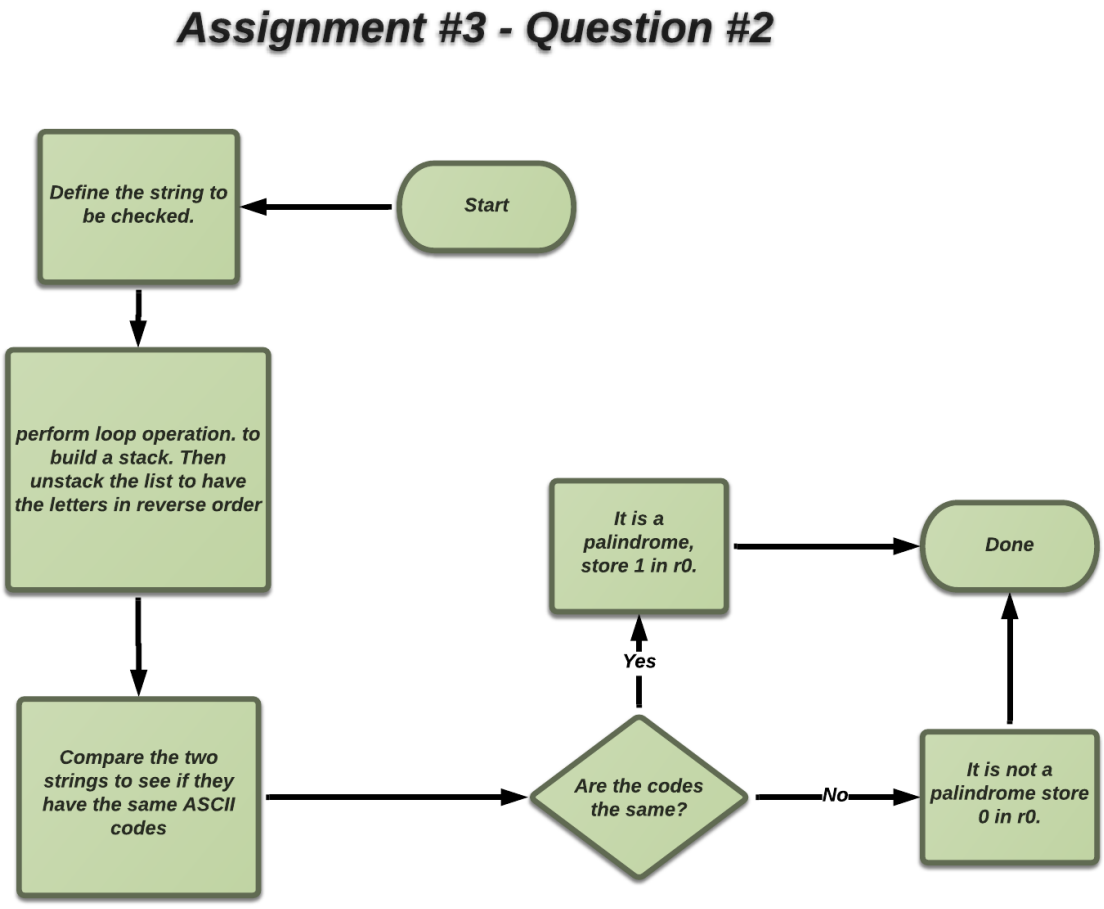


Code:

```
    AREA QUESTION1, CODE, READONLY          ;Naming Code
    ENTRY

                                            ;first loop to add for first sum
Start1      ADR     r0, UPC                 ;point r0 to UPC code
            MOV     r1, #12                 ;start loop counter in r1 as length of array
            MOV     r2, #0                  ;clear sum of r2 for running total
Loop1       LDR     r3, [r0]                ;load r3 with what r0 is pointing at
            ADD     r0,r0,#4                ;add 4 bytes to move 1 place in UPC code
            ADD     r2,r2,r3                ;add r2 and r3 to have running total of first sum
            SUBS    r1,r1,#2                ;increment r1 to move places along array every 2 spaces for even places
            BNE     Loop1
Endless1    B       Endless1

                                            ;second sum loop to add
Start2      ADR     r0, UPC                 ;point r0 to UPC code
            MOV     r1, #11                 ;start loop counter in r1 as length of array start at 11 rather then 12 for odd placements
            MOV     r3, #0                  ;clear sum of r2 for running total
Loop2       LDR     r4, [r0]                ;load r3 with what r0 is pointing at
            ADD     r0,r0,#4                ;add 4 bytes to move 1 place in UPC code
            ADD     r3,r3,r4                ;add r2 and r3 to have running total of first sum
            SUBS    r1,r1,#2                ;increment r1 to move places along array every 2 spaces for odd placements
            BNE     Loop2
Endless2    B       Endless2

            ADD     r2,r2,r2,LSL #1         ;multiply first sum by 3
            ADD     r2,r2,r3                ;adding the two sums together
            SUBS    r2,r2,#1                ;subtracting 1 from the sum

mod         TEQ     r2,#10                  ;compare if sum is less then 10 for mod
            SUBS    r2,r2,#10               ;repeteadly subtract 10
            BNE     mod

check0      CMP     r2,#Check_Digit         ;compare sum with check digit to see if valid UPC or not
            MOVEQ   r0,#1                   ;set r0 to 1 if the UPC is valid
            BNE     check0
check1      CMPNE   r2, #Check_Digit        ;check to see if upc code is not equal to check digit
            MOVEQ   r0,#0                   ;set r0 to 0 if the UPC is invalid
            BNE     check1

UPC         DCB 0,1,3,8,0,0,1,5,0,7,3,8     ;UPC string
Check_Digit EQU 8                           ;Check digit definition

    END
```

Question #2

Flow Chart:



Code:

```
    AREA QUESTION2, CODE, READONLY
    ENTRY

Start       ADR     r0,STRING               ;set r0 to point to string
            MOV     r1, #0x00               ;set r1 to loop counter
            MOV     r2, #0                  ;set r2 to zero to clear
            MOV     r3, #0                  ;clear r3 to pop stack into

Loop        STMFA   r0!, {r2}               ;push entire string onto a full ascending stack from pointer r0 to r2
            ADD     r0,r0,#4                ;move r0 4 bytes
            SUBS    r1,r1,#1                ;subtract one from counter
            BNE     Loop                    ;end loop
            LDMFA   r2!, {r3}               ;pop stack from r2 into r3

Endless     B       Endless                 ;infinite loop

compare1    CMPEQ   r3,#STRING              ;compare newly reversed string with original
            MOVEQ   r0,#1                   ;set r0 to 1 if it is a Palindrome
            BNE     compare1                ;end compare

compare0    CMPNE   r3,#STRING              ;comapre if strings do not match
            MOVEQ   r0,#0                   ;set r0 to 0 if it is not a Palindrome
            BNE     compare0                ;end compare

STRING      DCB     "He lived as a devil, eh?"  ;string
EoS         DCB     0x00                    ;end of string

    END
```