Assignment #4
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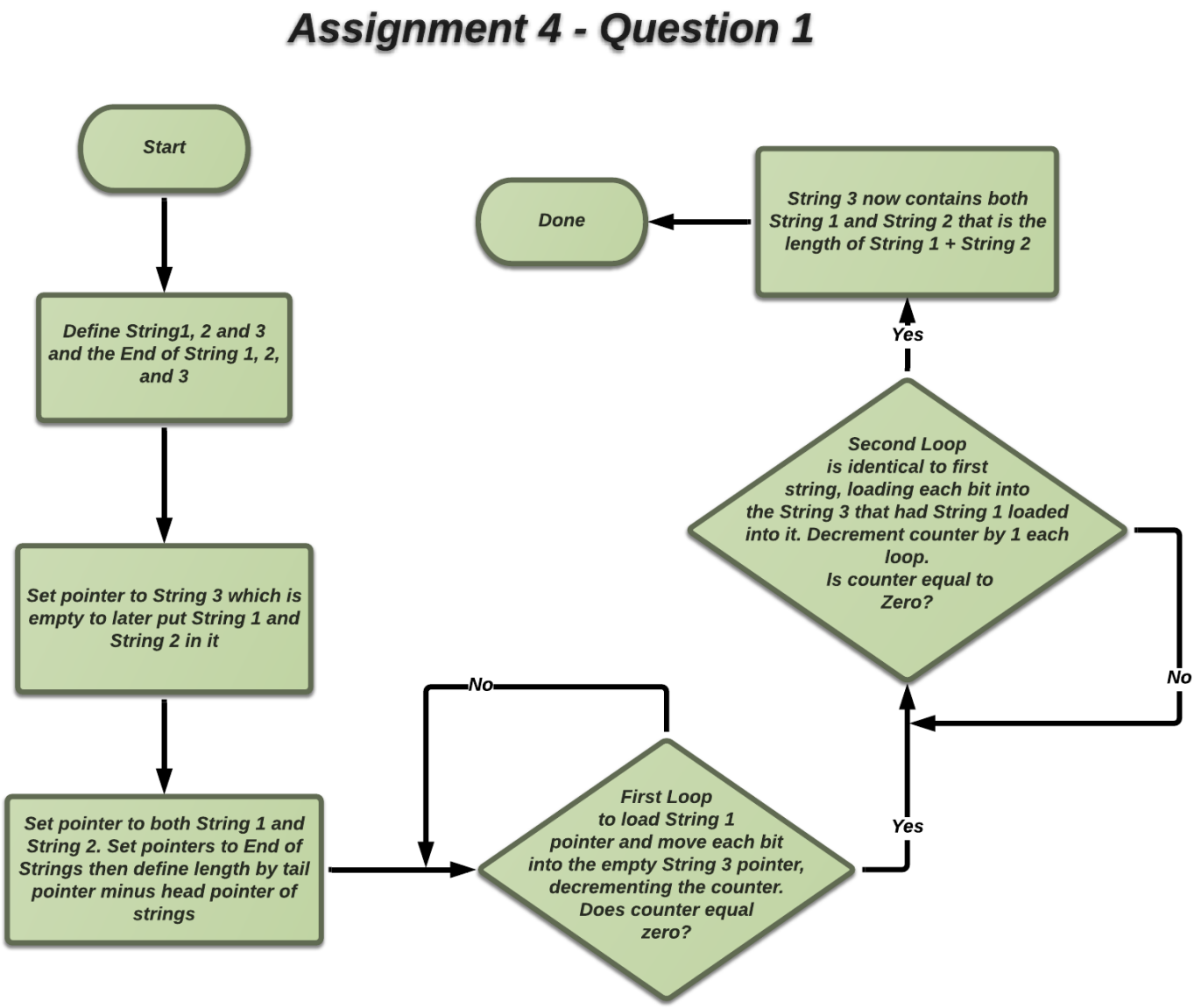
Question 1

Code:

```
1     AREA a4_question1, CODE, READONLY
2     ENTRY
3
4             ADR     r0, STRING3                 ;Address of first block in destinatior
5
6                                                 ;String 1 pointers
7             ADR     r1, STRING1                 ;Address of first string
8             ADR     r2, EoS                     ;Address of EoS1
9             SUBS    r2, r2,r1                   ;Length of string1, counter
10
11                                                ;String 2 pointers
12            ADR     r3, STRING2                 ;Address of second string
13            ADR     r4, EoS2                    ;Address of EoS2
14            SUBS    r4, r4,r3                   ;Length of String2
15
16                                                ;First String Loop
17 Loop1      LDRB    r5,[r1],#1                  ;Load next bit of "r1" in r5
18            STRB    r5,[r0],#1                  ;Store prev bit in memory at r0
19            SUBS    r2, r2, #1                  ;Decrement counter
20            CMP     r2, #0                      ;Compare our counter
21            BNE     Loop1                       ;end loop if counter = 0
22
23                                                ;Second String Loop
24 Loop2      LDRB    r5,[r3],#1                  ;Load next bit of "r3" to r5
25            STRB    r0,[r5],#1                  ;Store this bit in r0
26            SUBS    r4, r4, #1                  ;Decrement length counter
27            CMP     r4, #0                      ;Compare our counter
28            BNE     Loop2                       ;end loop if counter = 0
29
30 STRING1    DCB     "This is a test string1"    ;string 1
31 EoS        DCB     0x00                        ;end of string 1
32 STRING2    DCB     "This is a test string2"    ;string 2
33 EoS2       DCB     0x00                        ;end of string 2
34 STRING3    space   0xFF                        ;third string for concatenation
35
36    END
```

Flow Chart:

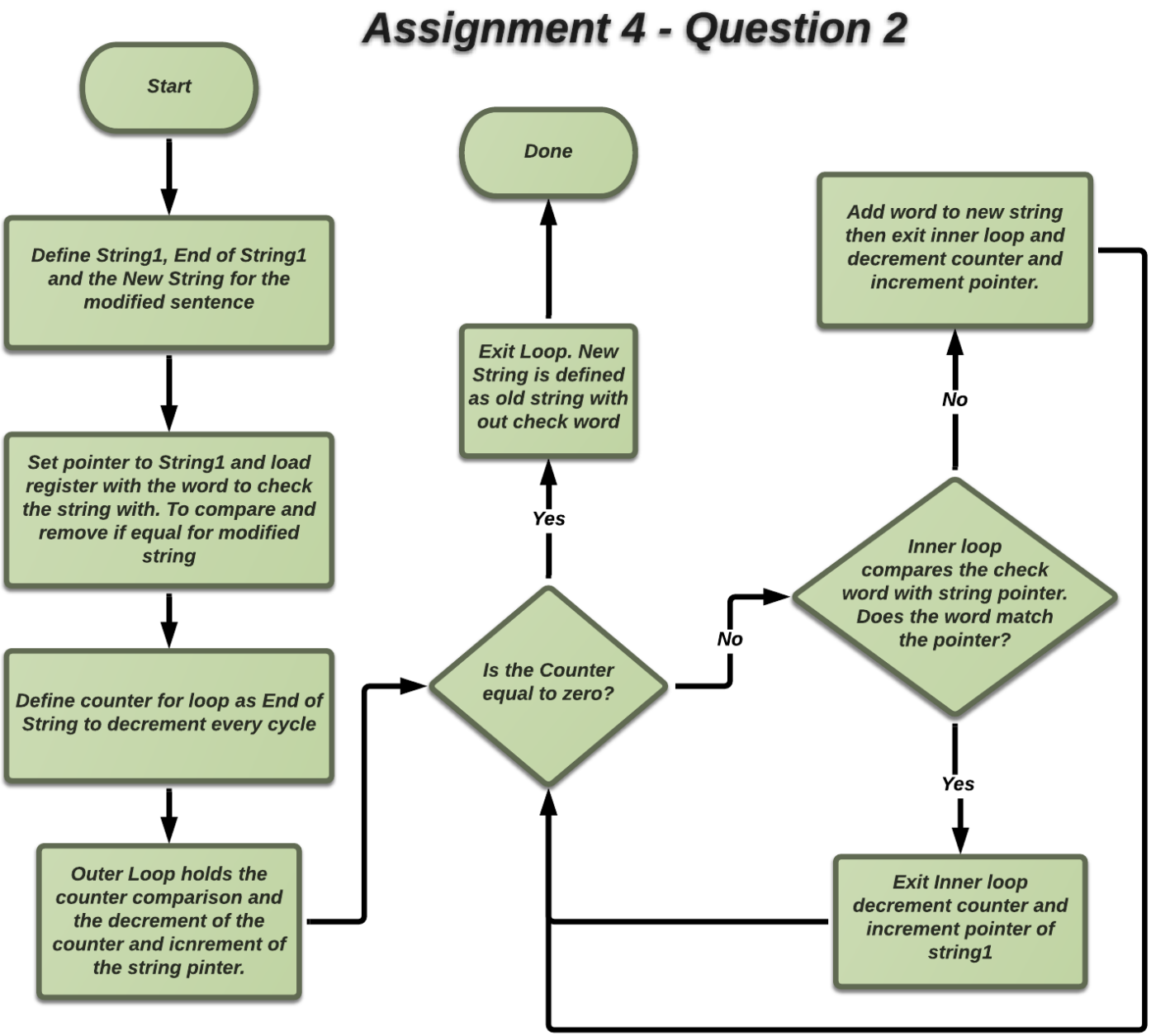

Assignment 4 - Question 1
Start
Define String1, 2 and 3 and the End of String 1, 2, and 3
Set pointer to String 3 which is empty to later put String 1 and String 2 in it
Set pointer to both String 1 and String 2. Set pointers to End of Strings then define length by tail pointer minus head pointer of strings
First Loop to load String 1 pointer and move each bit into the empty String 3 pointer, decrementing the counter. Does counter equal zero?
No
Yes
Second Loop is identical to first string, loading each bit into the String 3 that had String 1 loaded into it. Decrement counter by 1 each loop. Is counter equal to Zero?
No
Yes
String 3 now contains both String 1 and String 2 that is the length of String 1 + String 2
Done

Question 2

Code:

```
    AREA a4_question2, CODE, READONLY
    ENTRY

            ADR     r0,STRING1                      ;set pointer to string1
            LDR     r1,CHECK                        ;load pointer with word to be checked
            LDR     r2,EoS                          ;set counter to end of string to decrement

Loop        CMP     r1,#0                           ;set counter to exit when 0
NewS        CMPNE   r0,r1                           ;compare the word in the string to the check
            ADD     r3,r3,r0                        ;add pointer from string if not equal to che
            BEQ     NewS                            ;end compare and loop if r0 and r1 are equal
            ADD     r0,r0,#4                        ;move pointer to next byte
            SUBS    r1,r1,#1                        ;decrement counter from EoS
            BNE     Loop

STRING1     DCB     "and the man said they must go"     ;String1
EoS         DCB     0x00                            ;end of string1
STRING2     space   0xFF
CHECK       DCB     "the"                           ;word to remove from string
    END

```

Flow Chart:

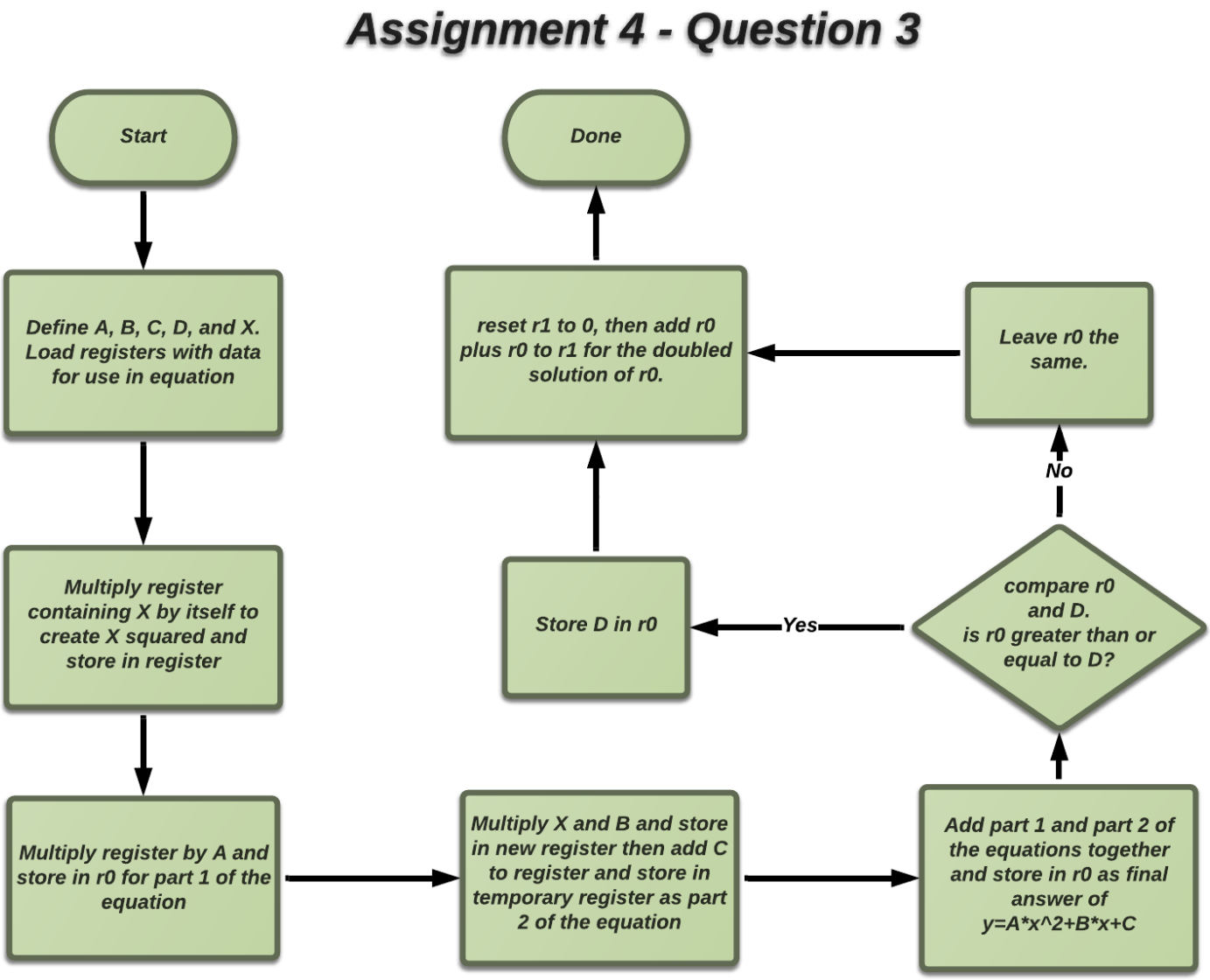

Assignment 4 - Question 2
Start
Define String1, End of String1 and the New String for the modified sentence
Set pointer to String1 and load register with the word to check the string with. To compare and remove if equal for modified string
Define counter for loop as End of String to decrement every cycle
Outer Loop holds the counter comparison and the decrement of the counter and icnrement of the string pinter.
Is the Counter equal to zero?
Yes
Exit Loop. New String is defined as old string with out check word
Done
No
Inner loop compares the check word with string pointer. Does the word match the pointer?
No
Add word to new string then exit inner loop and decrement counter and increment pointer.
Yes
Exit Inner loop decrement counter and increment pointer of string1

Question 3

Code:

```
1     AREA a4_question3, CODE, READONLY
2     ENTRY
3
4         LDR     r1,R                ;load working register temporarily representing 'x'
5         LDR     r2,X                ;load working register with A
6         LDR     r3,Y                ;load working register with B
7         LDR     r4,Z                ;load register with C for function
8         LDR     r5,D                ;load register with value of D to compare later
9
10        MUL     r6,r1,r1            ;multiply r1 by itself for x squard and store in register
11        MUL     r0,r6,r2            ;multiply register and B and store in r0
12        MUL     r7,r1,r3            ;multiply register by B
13        ADD     r7,r7,r4            ;add second part of equation by B and accumulate
14        ADD     r0,r0,r7            ;add r0 with second part of equation to get total of equatio
15
16        CMP     r0,r5               ;compare if r0 and D
17        MOVGE   r0,r5               ;if r0 is greater than or equal to D store D in r0
18
19        MOV     r1,#0               ;reset r1 to 0 for final result
20        ADD     r1,r0,r0            ;r1 is equal to r0 doubled which is r0 plus r0
21 halt   B       halt                ;to end the program
22
23 X      DCD     5                   ;define A
24 Y      DCD     6                   ;define B
25 Z      DCD     7                   ;define C
26 D      DCD     50                  ;define D
27 R      DCD     3                   ;constant for register 0
28
29    END
```

Flow Chart:


Assignment 4 - Question 3
Start
Define A, B, C, D, and X. Load registers with data for use in equation
Multiply register containing X by itself to create X squared and store in register
Multiply register by A and store in r0 for part 1 of the equation
Multiply X and B and store in new register then add C to register and store in temporary register as part 2 of the equation
Add part 1 and part 2 of the equations together and store in r0 as final answer of y=A*x^2+B*x+C
compare r0 and D. is r0 greater than or equal to D?
Yes
No
Store D in r0
Leave r0 the same.
reset r1 to 0, then add r0 plus r0 to r1 for the doubled solution of r0.
Done