

//Q1. Write a C function to initialize SysTick Timer with maximum reload value.

```
void SysTick_Init()
{
    NVIC_ST_CTRL_R = 0x0;                //Clear the ENABLE bit
    NVIC_ST_RELOAD_R = 0x00FFFFFF;       //Set the RELOAD Register with maximum 24-bit value
    NVIC_ST_CURRENT_R = 0x0;             //Clear the counter
    NVIC_ST_CTRL_R |= 0x5;               //Set the ENABLE & CLK_SRC bits to turn on SysTick
}
```

/*Q2. Write a C function that wait for 1 ms using SysTick timer.
Assume the SysTick timer operates on 80 MHZ.*/

```
void SysTick_wait1ms ()
{

    NVIC_ST_CURRENT_R = 0x0;
    NVIC_ST_RELOAD_R = 80000-1;                                     //1ms * 80MHz = 80000s & (-1) delay term

    while( (NVIC_ST_CTRL_R & 0x00010000) == 0) {}                 //Checking for count bit

}
```

;Q3. Repeat the previous questions using assembly.

SysTick_Init

```
LDR R1, =NVIC_ST_CTRL_R
MOV R0, #0x0
STR R0, [R1]                                ;Clear the ENABLE bit

LDR R1, =NVIC_ST_RELOAD_R
LDR R0, =0x0FFFFFFF
STR R0, [R1]                                ;Set the RELOAD Register with Max. value

LDR R1, =NVIC_ST_CURRENT_R
MOV R0, #0x0
STR R0, [R1]                                ;Clear the counter

LDR R1, =NVIC_ST_CTRL_R
LDR R0, [R1]
ORR R0, R0, #0x5                             ;Set the ENABLE & CLK_SRC bits to turn on SysTick

BX LR
```

SysTick_wait1ms

```
LDR R1, =NVIC_ST_CURRENT_R
MOV R0, #0x0
STR R0, [R1]
```

```
LDR R1, =NVIC_ST_RELOAD_R
LDR R0, =0x1387F
STR R0, [R1]
```

wait_loop

```
LDR R1, =NVIC_ST_CTRL_R
LDR R0, [R1]
ANDS R0, R0, #0x00010000
BEQ wait_loop
```

```
BX LR
```

```
/*Q4. Write a C function that uses the function written in Q2  
to make a generic delay function that wait for multiples of 1 ms.*/
```

```
void Delay(uint32_t time)                                //input parameter is the multiples of 1ms  
{                                                        //for loop counter  
    uint32_t i;  
  
    for (i=0;i<time;i++)  
    {  
        SysTick_wait1ms();  
    }  
}
```

/*Q5. Write a C program to flash the RGB LED of TivaC for each color in order red, blue then green, with delay 1 sec between each color, where red color is represented by 0x02, blue color is represented by 0x04, and green color is represented by 0x08. Assume the SysTick timer operates on 80 MHZ.*/

```
void main()
{
    unsigned char LED;

    while(1)
    {
        for( LED=0x02 ; LED<=0x08 ; LED=LED<<1 )
        {
            GPIO_PORTF_DATA_R &= ~0x0E;           //Initialize LEDs to be OFF
            GPIO_PORTF_DATA_R = LED;

            delay(1000);
        }
    }
}
```