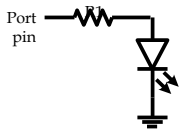
(25) 3.1. Draw the stack frame and enter the value of each stack slot (if it is known) at the end of the following instruction sequence (you may assume that the stack starts at $3c00):

```
        leas -2,SP
        clrb
        ldaa #20
        psha
        ldaa #$E0
        psha
        ldx #$7000
        pshx
        jsr sub_abc
        …
sub_abc pshd
        leas -12,SP
```

(25) 3.2. Write a program to create a delay of 5 seconds.

(25) 3.3. Use the HCS12 Port B to drive eight LEDs. Light each of them for half a second in turn and repeat. Assume that there is already a subroutine which provides 500 ms delay. The LEDs are connected as shown in the figure below.



(25) 3.4. Write a C language program for problem 3.3.

(25) 3.5. Below are some data in the HC12 memory:

2000 - D6 05 35 CF E0 00 FE 08 20 A6 00 47 6A 05 08 53
2010 - 26 F7 34 C6 C8 CD 9C 40 03 26 FD 53 26 F7 3D 3F
2020 - 07 C2 3A 68 F3 09 C2 67 9A 0F AA 55 08 40 CD CF

Indicate the values in the registers after the HC12 executes the following instructions. Also write down the number of cycles needed to execute each instruction. Show what will be in the registers (in hex) after each of the instructions. If the instruction does not change a register, you may leave that entry blank. Note that the first instruction is located at address 0x1000.

Instruction	A	B	X	Y	SP	N	Z	V	C	Addressing Mode	Effective Address
	$AA	$BB	$2010	$2020	$3C00	1	0	1	0		
lds #$2010										IMM	$2010
cpd $2022										EXT	$2022
pulx										INH	-
asla										INH	-
staa $2015										EXT	$2015
adda 4,x+										IDX	$26F7

*The last value of A is the result of ANDing A with what X is pointing at address $26F7 (which is an $81 if the micro is coming out of a reset, but the student may assume another value).