Tutorial 4

Question 1: (13)

a) Assume we had a 10-bit value. When treated as a signed number, what is the range (minimum and maximum value) which this 10-bit value can take on? (2)

What will the state of the N, C, Z and V flags be after the following computations. Remember that subtracts are implemented as Add(Rn, NOT(Rm), 1)
Marking: 4 x 4 x 0.5 = 8

	Instruction	Rn	Rm
b)	ADDS	0xFF	0xFFFF FF00
c)	SUBS	0x01	0x01
d)	SUBS	0xFF	0x100
e)	SUBS	0xFF	0xFE
f)	ADDS	0x8000 0000	0x8000 0000

g) What does the LDRSB instruction do? (2)
h) Assuming a register is loaded with the LDRSB instruction, what is the difference in value between the 8-bit value in memory when treated as an 8-bit signed number and the 32-bit value in the target CPU register when treated as a signed number? (1)

Question 2: (6)

a) Write a small block of instructions which will generate a hard fault. (2)
b) What action does the CPU take when an exception occurs? (2)
c) Why is it a good idea put the address of an exception handler in the hard fault vector location (and all other vector locations as well, for that matter), rather than just put instructions there? (1)

Question 3: (5)

a) Explain what stack ‘peaking’ is and why it is useful. (2)
b) Explain how subroutines work. (3)

Question 4: (2)

Assume we have:
- a CPU running at 8 MHz,
- a delay loop which consumes 5 cycles per loop iteration
- a value which varies between 0 and 255 which we want to use to cause a variable delay.
- the delay must be 0 seconds when the value is 0 and 1 second when the value is 255.

What number (to the nearest integer) must we multiply the variable value by in order to get the number of delay loop iterations required? (2)

Marked out of: 26