# Tutorial 3

Note: specify all numbers in hex. Remember: all bits are 0 indexed.

**Question 1: Branching**

a) What is the purpose of the APSR? (1)

Assuming that the APSR holds the value: 0xC0000000, will the following branches be taken or ignored? (See Table 17 of the programming manual)

b) BEQ

c) BHI

d) BGT (3x1 = 3)

d) Write a sequence of instruction which will cause the Program Counter to be loaded with the address of the instruction labeled as `"foo"` if the value of R1 is zero. (2)

e) Write a sequence of instructions which will cause the Program Counter to be loaded with the address of the instruction labeled as `"bar"` if the value in R1 is the same as that in R2 (2)

f) Write a sequence of instructions which will cause the Program Counter to be loaded with the address of the instruction labeled as `"baz"` if the value in R0 is equal to 0x1A2B3C4D (2)

**Question 2: Input pins**

a) What is the base address of the peripheral which manages the pins connect to the push-buttons? (1)

a) Why is it necessary to use pull-up resistors when we want to use the push buttons? (2)

**Question 3: Masking**

b) Write <u>two</u> instructions which will force bits 0, bit 1, bit 2 and bit 3 of R0 to a logic 1, while keeping the other bits unchanged. (2)

c) Write <u>two</u> instructions which will clear (change to a logic 0) all of the bits in R0 except for bit 11 and 12, which should be left unchanged. (2)

d) Write <u>three</u> instruction which will cause a branch to the label `"foobar"` if the 23rd bit of R2 is a logic 1. (2)

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