Each problem is worth 1 point.

1) Given \((20)_{10} = (10100)_{2}\). The bits of \((-20)_{10}\) are to be placed in a 16 bit register (using 2's compliment representation). Show all the 16 bits in this register.
\[
(-20)_{10} \rightarrow 11101100
\]

2) Let \(a = (11100000)_{2}\) and \(b = (-1)_{10}\), assume that we are using signed binary numbers stored in 8 bit registers. Let \(c = a + b\).
   i) Show all the binary bits of \(c\)
   ii) By using the argument based on "carry out of signed bit" and "carry into the signed bit" determine if there is overflow.

3) Express \((10000000)_{2}\) as a decimal number,
   i) If we are using signed numbers
   ii) If we are using unsigned numbers

4) Answer the following questions about the Launchpad.
   i) What type of microcontroller is used in it? \(\text{MSP430 G2553}\)
   ii) What is the size of the ROM used in the microcontroller? \(16\text{KB}\)
   iii) What is the size of the RAM used in the microcontroller? \(512\text{B}\)

5) What does 20P-DIP stand for? \(20\text{-Pin Plastic Dual Inline Package}\)

6) The bits 11100010 are stored in an 8 bit register to represent a signed binary number. This number is divided by 8 and stored in another 8 bit register. Show all the bits in this register.
\[
\text{padding} \quad 1111100 \quad \text{discard fractional part}
\]

7) A switch is to be connected to a pin of a microcontroller so that the pin registers a logical 0 if the switch is closed and a logical 1 if the switch is open. Draw a circuit diagram showing how you will connect this switch to the pin.

8) What does the acronym MCU stand for?

9) Bonus point

10) Bonus point