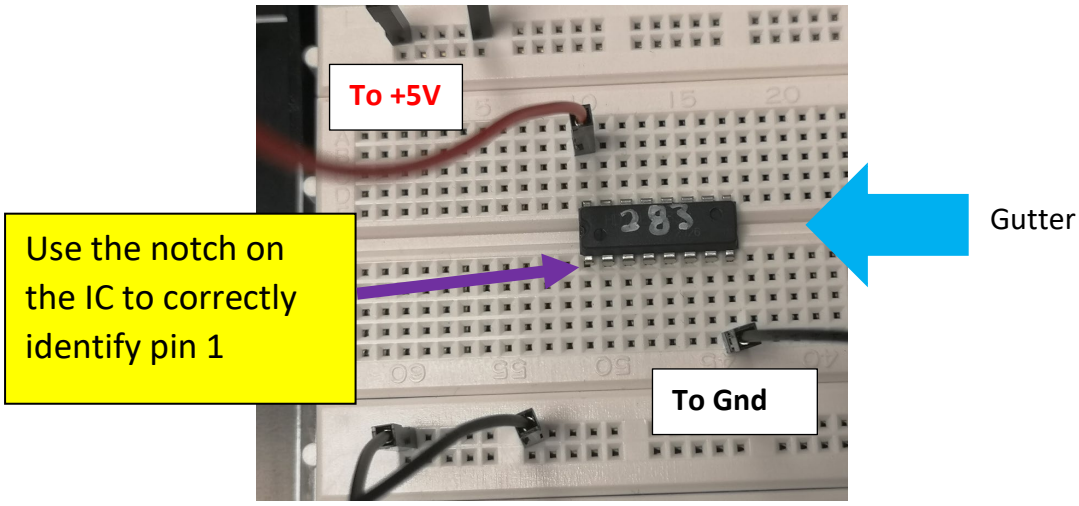
SC1005 Lab 2 circuit connection guide – version B

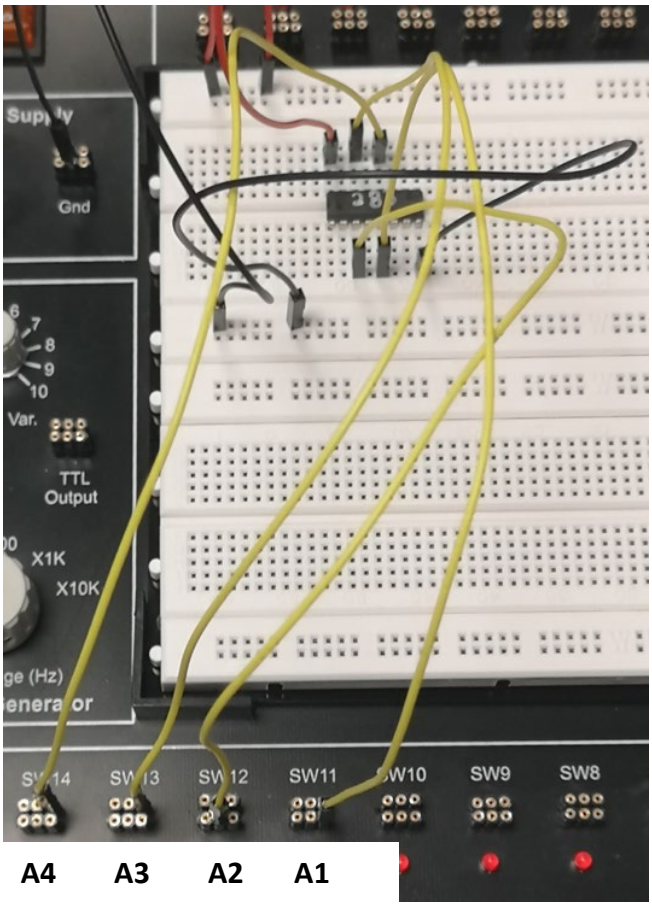
Different colour wires (they are the same functionally) are usually used to make circuit connections easier to trace. Students are encouraged to follow the wire colours suggested in this guide so that it is easier to trace the logic signals as well as to troubleshoot in the event the connected circuit does not function as expected.

ALWAYS turn OFF the power when making circuit connections

1. Mount the IC 74LS283 (4-bit adder) firmly on the breadboard across the gutter and connect its Vcc (pin 16, **red** wire) and Gnd (pin 8, **black** wire) to 5V and 0V respectively.



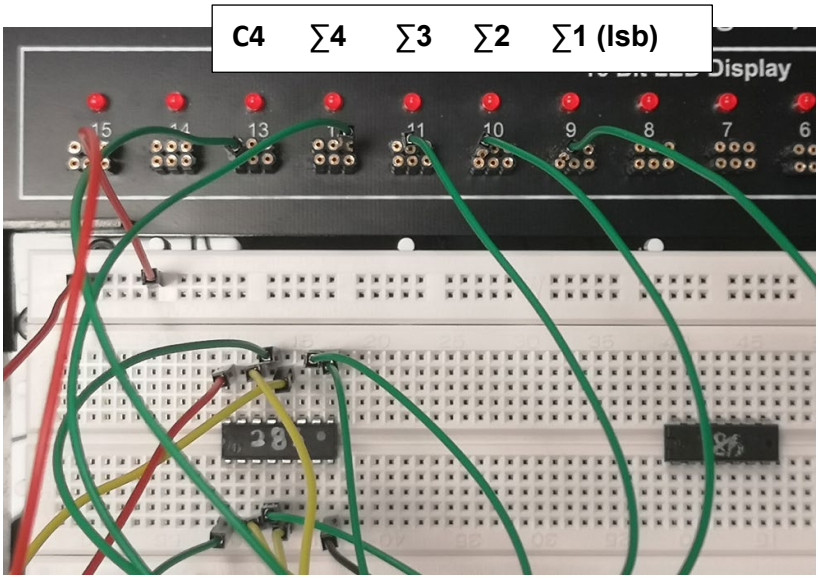
2. Connect the **input** A4, A3, A2, A1 (pin 12, 14, 3, 5) to a toggle switch each (**yellow** wires).



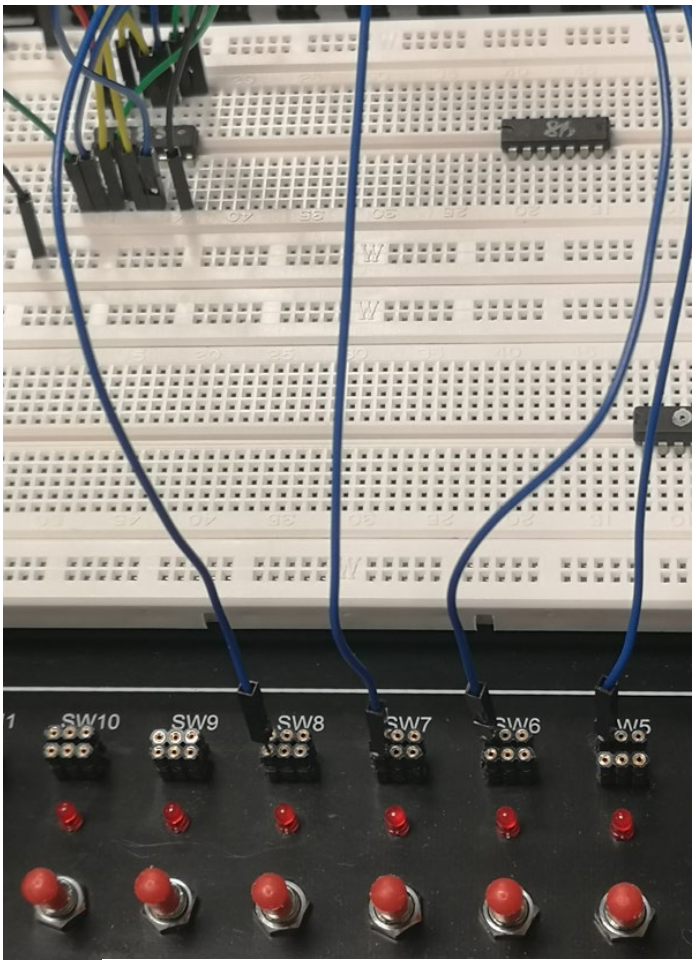
Inputs: **A4** **A3** **A2** **A1**

(Msb) **(lsb)**

3. Connect the **output** C4, ∑4 , ∑3, ∑2, ∑1 (pin 9, 10, 13, 1, 4) to an LED each (**green** wires).



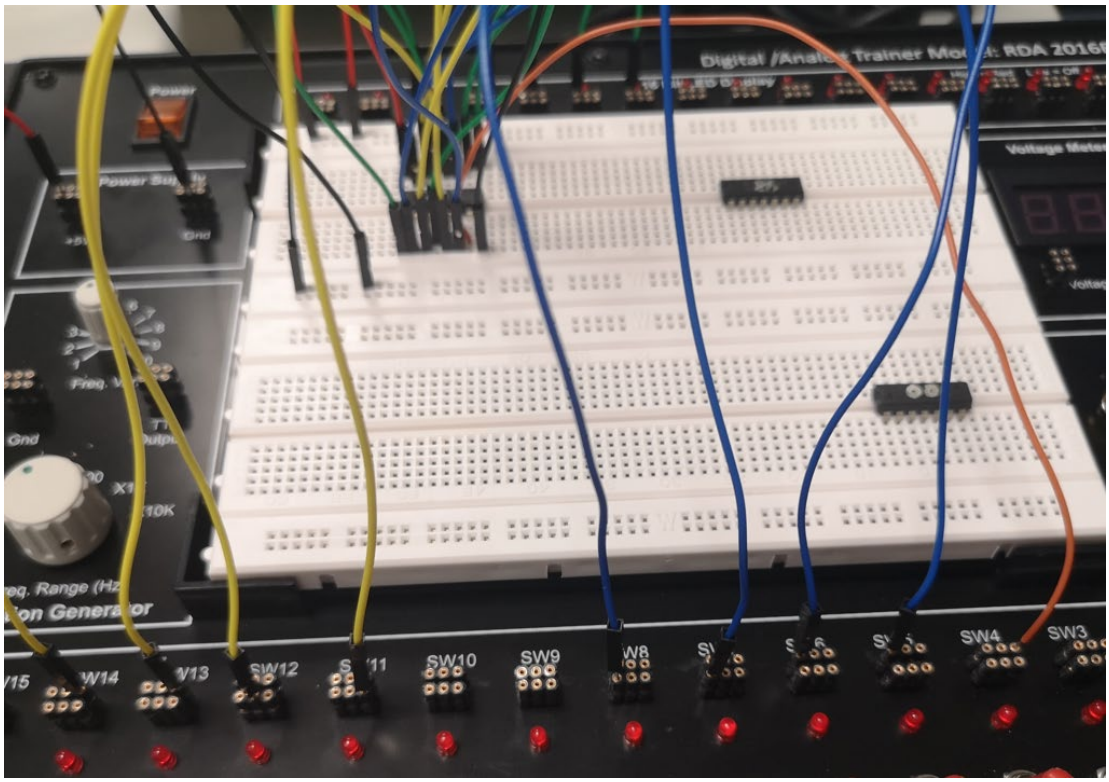
4. Connect the **input** B4, B3, B2, B1 (pin 11, 15, 2, 6) to a toggle switch each (**blue** wires).



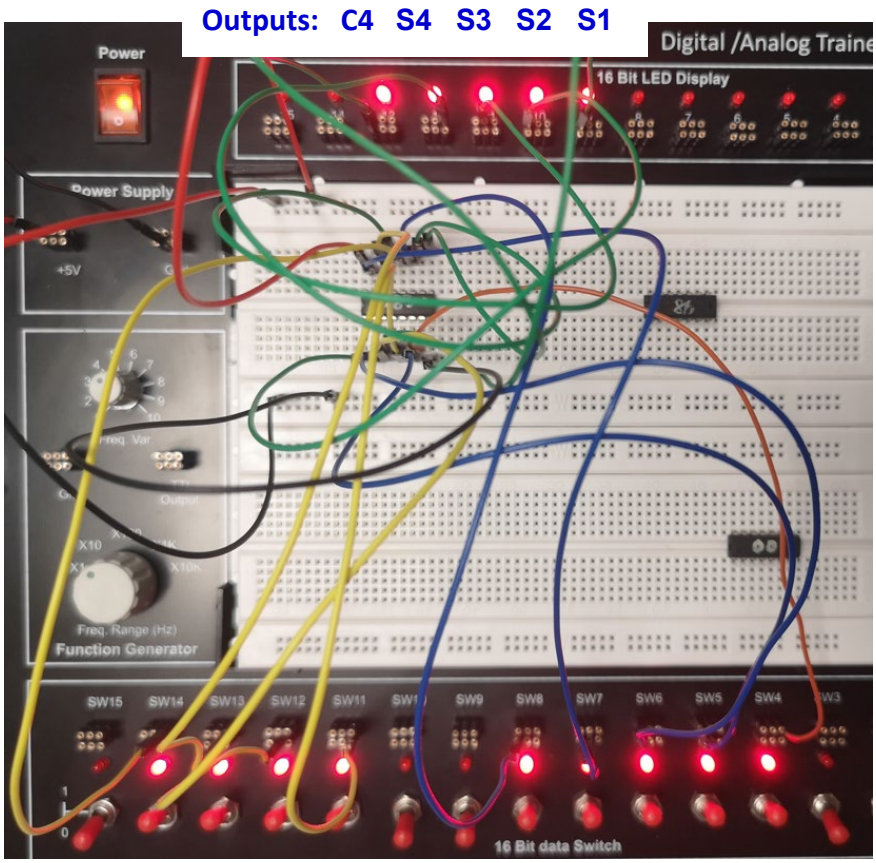
Inputs: B4 B3 B2 B1

(Msb) (lsb)

5. Connect the **Carry input** C0 (pin 7) to a toggle switch (**orange** wire).



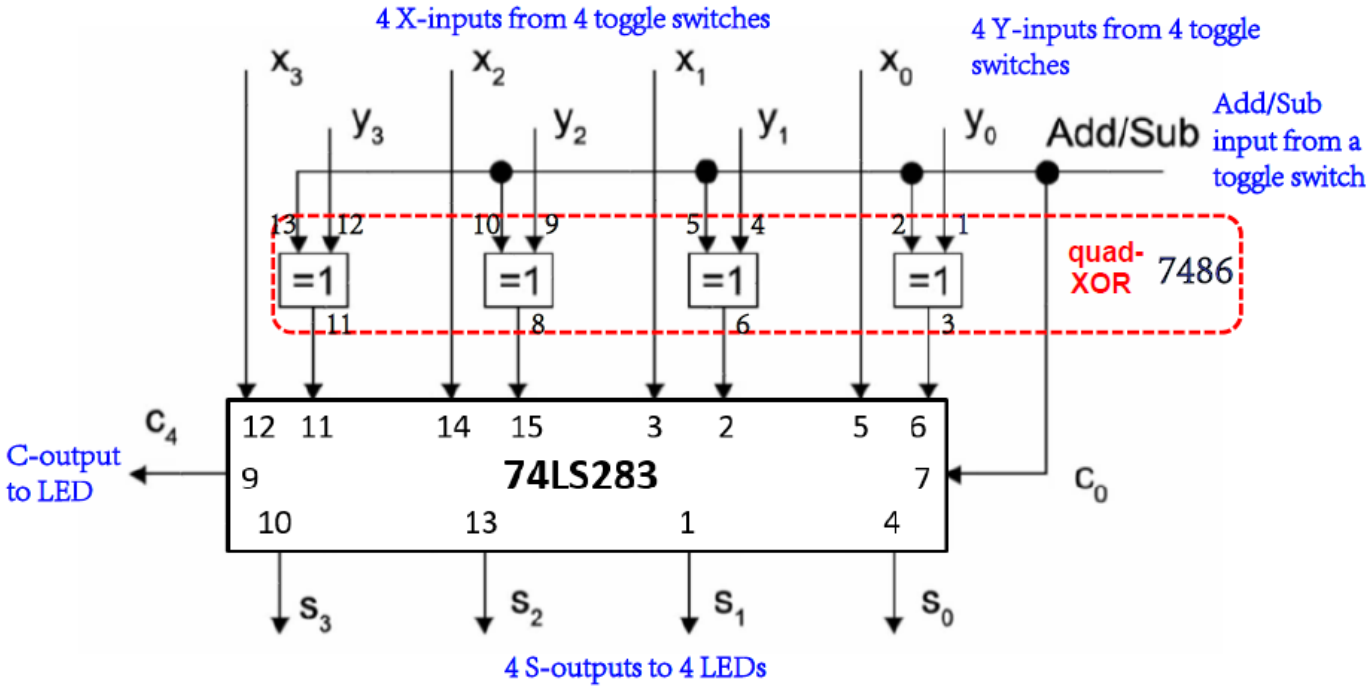
6. Power up the circuit and test it out for arithmetic addition. This figure shows the largest addition result that can be produced by the 4-bit adder.



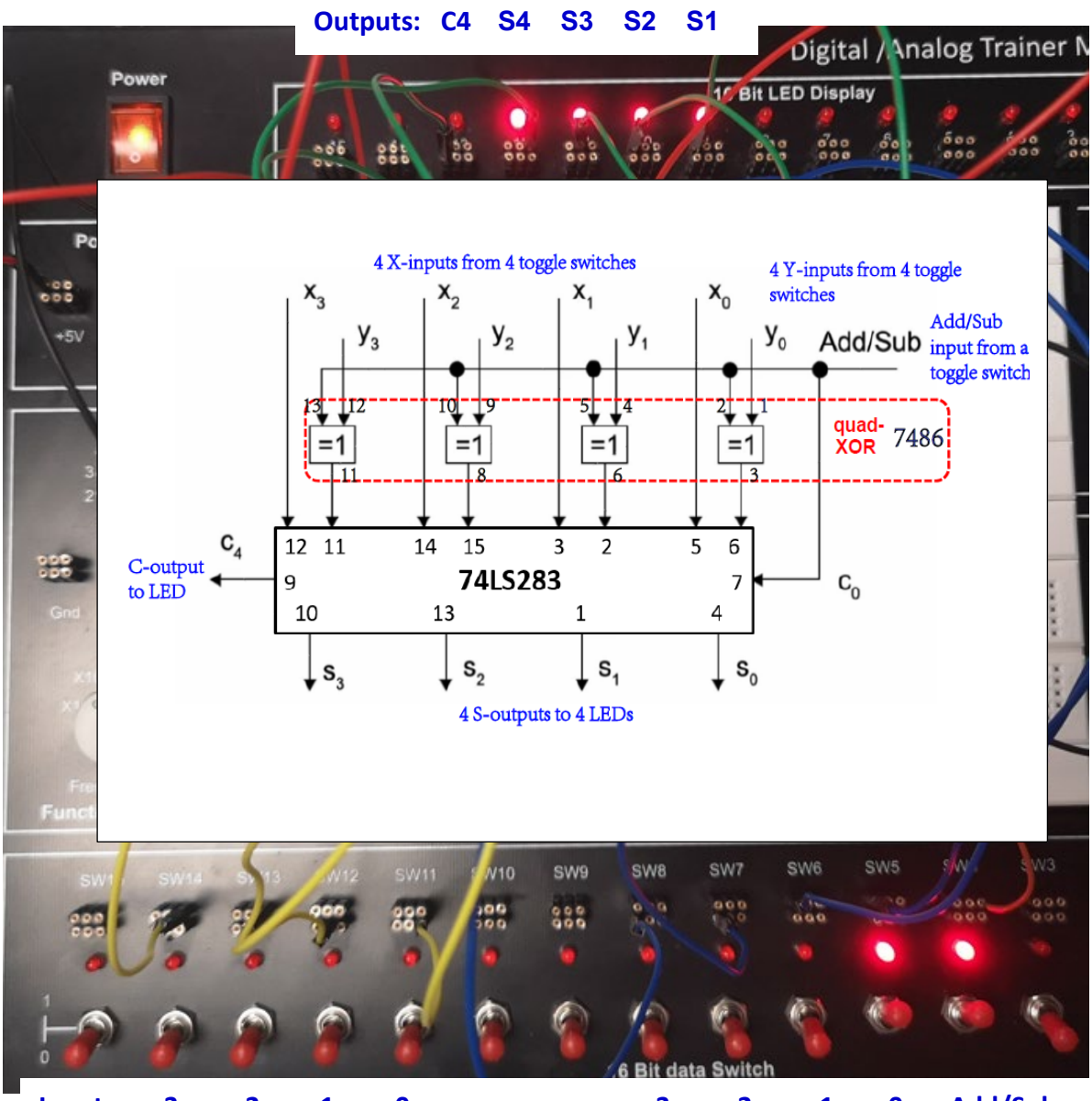

```
      1
  1 1 1 1
+ 1 1 1 1
= 1 1 1 1 1
```

7. **Power off the circuit board.** Mount the 74LS86 (quad-XOR) IC and connect its Vcc (pin 14) to 5V and Gnd (pin 7) to 0V.

8. Connect the circuit using the information from Figure 4 in the lab manual (reproduced below for your convenience). **Take care to connect it correctly**, otherwise you will need to spend far more time on figuring out why it does not work.



9. Power up the circuit and test it out for arithmetic addition and subtraction. This figure shows the binary result of x – y (x=0000, y=0001).



Example:

	0 0 0 0	(0 0 0 0)	
	1 1 1 0	(Invert 0001)	2's complement of 0001
+	1	(Cin = 1)	
	1 1 1 1	(-1)	