Lecture 3- Worksheet

Question 1:

In 1-2 sentences write why interfaces are important.

(hint: think about what would happen if we didn't have them?)

Question 2:

Using nand gates draw a gate circuit for constant 0. (hint: write down your solution as a logic expression first e.g. a nand b)
(second hint: you don't need to use both the a and b inputs.)

Question 3:

Write down a logical expression and a truth table for building an and gate using or and not. **Auxiliary question** – do you think there is only a finite number of ways of expressing and using other gates? Can you **prove** your answer?

Question 4

In a 3 bit register the number 7 is 111 and number 8 is “overflow”. While it is true that hardware can be set up to detect overflow it is likely that there will still be digits readable in the 3 bit registers. Write down what do you think would appear in a 3 bit register if you loaded it with the number 8? What about if you loaded it with 12?

Question 5

In groups in 30 seconds quickly name ideas for representing negative numbers in binary.

Now try this idea, for a 4-bit number, draw a number line with 16 values .. 0000 represents the number zero. Now take the right half of the number line – all values 1000 and above - and simply place it to the left of zero. Now the number to the left of zero (representing -1) is 1111 and -2 is 1110 and so on. What is the result of adding -2 to +3? What about -1+7? What about 7+1?

Question 6

Using gates you've seen already come up with a combination of two gates that represents a half-adder. (hint: look a the truth table on the lecture slide).