

1. Design a combinational circuit with a 3-bit input and a 1-bit output. The output should be 1 when the input is less than 3; and 0 otherwise.
2. Design a combinational circuit with 3-bit input and 3-bit output. When the input is either 0,1,2, or 3; the output is two greater than the input. When the input is 4,5,6, or 7, the output is three less than the input.
3. A majority circuit is a combinational circuit whose output is 1 if the input bits have more 1s than 0s. The output is 0 otherwise. Design a 3-input majority circuit.
4. Using half-adders and full-adders, implement a 3-bit multiplier.
5. Implement the following functions using decoders
 - a. $F(A, B, C, D) = \sum(3,4,9,11,15)$
 - b. $F(x, y, z) = \prod(2,4,5,7)$
6. A magnitude comparator circuit that takes in two 2-bit inputs (A & B). The circuit has three outputs as E, G, L. If A=B, E=1 and G=L=0. If A>B, G=1 and E=L=0. If A<B, L=1 and E=G=0. Implement this circuit using decoders and OR gates only.