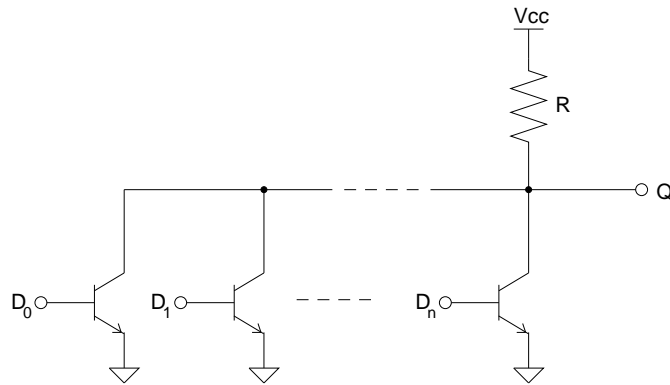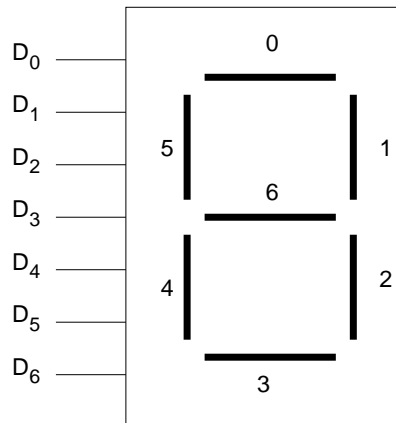# Physics 536 - Assignment #8

1. Explain what logical function is performed by the following circuit:

2. Write the truth table for a logic element that takes two 2-bit inputs, A_0, A_1 and B_0, B_1 and produces a 4-bit output, $Q_{0...3}$ that represents their multiplicative product.

3. The segments in a 7-segment Light Emitting Diode array are numbered as shown in the diagram:

That is, when $D_i = 1$, segment i is lit.

(a) Write the truth table for a 4-bit to 7-segment decoder that will light the appropriate segments when the inputs, $A_0 \ldots A_3$ represents the binary numbers $0 \ldots 7$.

(b) Write Boolean algebraic expressions for D_2, D_1 and D_0 as functions of the inputs A_j.

(c) Draw a schematic diagram that shows an implementation of the logic for D_2 using only NAND gates.