Digital Electronics

You are to design a 2-bit multiplier which takes inputs $b_1 b_0 a_1 a_0$ representing two unsigned 2-bit numbers and produces a 4-bit result in the outputs $z_3 z_2 z_1 z_0$.

(a) Give a truth table for the outputs. [5 marks]

(b) Give simplified forms for $z_3 z_2 z_1 z_0$. [5 marks]

(c) Discuss alternatives for producing an 8-bit multiplier with special consideration for gate count and speed. Give a full design for one of the alternatives for a 4-bit adder. [10 marks]