Problem 3 (16 points). A switching circuit has two control inputs (**A** and **B**), two data inputs (**C** and **D**), and one output (**Z**). The circuit performs logic operations on the two data inputs, as shown in this table

A	**B**	Function performed by this circuit
0	0	OR(**C, D**)
0	1	AND(**C, D**)
1	0	XOR(**C, D**)
0	1	XNOR(**C, D**)

(a). (4 points) Use the Shannon's expansion theorem to expand the Boolean function **Z(A,B,C,D)** about variables **A** and **B**.
(b). (5 points) Use a Karnaugh map to obtain the minimal product of sum (POS) of **Z(A,B,C,D)**.
(c). (7 points) Convert the above minimal POS to a NAND network, and draw the circuit diagram.