Candidate Number: 2031B
Paper 2
Question 1

a. Here * means AND, and ‘ means NOT

i. (X+Y)*(X+Y’)
= X*X + X*Y’ + X*Y + Y*Y1
= X + X*X’ + X*Y
= X*(1 + Y + Y’)
= X*1
= X

ii.

X	Y	Z	X+Y	X’+Z	Y+Z	(X+Y)*(X’+Z)	(X+Y)*(X’+Z)*(Y+Z)
0	0	0	0	1	0	0	0
0	0	1	0	1	1	0	0
0	1	0	1	1	1	1	1
0	1	1	1	1	1	1	1
1	0	0	1	0	0	0	0
1	0	1	1	1	1	1	1
1	1	0	1	0	1	0	0
1	1	1	1	1	1	1	1

By observation of the right-most two columns being the same, the expressions must be equal: (X+Y)*(X’+Z) = (X+Y)*(X’+Z)*(Y+Z)

b. Let I = (A+C’+F’+G)*(A+C’+F+G)*(A+B+C’+D’+G)*(A+C+E+G)*(A’+B+G)*(B+C’+F+G)
Let X = A+C’+G
Therefore (A+C’+F’+G)*(A+C’+F+G) = (X+F’)*(X+F) = X = A+C’+G
Therefore I = (A+C’+G)*(A+B+C’+D’+G)*(A+C+E+G)*(A’+B+G)*(B+C’+F+G)
= (A+C’+G)*(A’+B+G)*(B+C’+F+G)*(A+B+C’+D’+G)*(A+C+E+G)
= (A+C’+G)*(A’+B+G)*(B+C’+G)*(B+C’+F+G)*(A+B+C’+D’+G)*(A+C+E+G) by rule ii.
= (A+C’+G)*(A’+B+G)*(B+C’+G)*(1+F)*(A+B+C’+D’+G)*(A+C+E+G)
= (A+C’+G)*(A’+B+G)*(B+C’+G)*(A+B+C’+D’+G)*(A+C+E+G)
= (A+C’+G)*(A’+B+G)*(B+C’+G)*(A+B+C’+D’+G)*(A+D’+G)*(A+C+E+G) by rule ii.
= (A+C’+G)*(A’+B+G)*(B+C’+G)*(A+D’+G)*(1+B+C’)*(A+C+E+G)
= (A+C’+G)*(A’+B+G)*(B+C’+G)*(A+D’+G)*(A+C+E+G)
= (A+C’+G)*(A’+B+G)*(A+D’+G)*(A+C+E+G) by rule ii.
= (A+C’+G)*(A’+B+G)*((A+G)+D’)*((A+G)+(C+E))
= (A+C’+G)*(A’+B+G)*((A+G)*(A+G)+(A+G)*(C+E)+D’*(A+G)+D’*(C+E))
= (A+C’+G)*(A’+B+G)*((A+G)*(1+D’+C+E)+D’*(C+E))
= (A+C’+G)*(A’+B+G)*(A+G+D’*(C+E))
= (A+C’+G)*(A’+B+G)*(A+G+C*D’+E*D’)
= (A+C’+G)*(A’+B+G)*(A+E+G)

c.

i.

CD\AB	00	01	11	10
00	1	0	1	1
01	0	0	1	1
11	0	0	0	1
10	0	0	1	1

Candidate Number: 2031B
Paper 2
Question 1

V = ((A'*B)+(A'*D)+(A'*C)+(B*C*D))'
= (A'*B)'*(A'*D)'*(A'*C)'*(B*C*D)'
= (A+B')*(A+D')*(A+C')*(B'+C'+D')

ii.