CSC 355

A1

Q5 $AB = 0,\ A+B = 1$ show $(A+C)(\bar{A}+B)(B+C) = BC$

$(A+C)(\bar{A}+B)(B+C)$

$= (A\bar{A} + AB + C\bar{A} + CB)(B+C)$ distribute

$= (C\bar{A} + CB)(B+C)$ complement, $AB=0$

$= C\bar{A}B + C\bar{A}C + CBB + CBC$ distribute

$= \bar{A}BC + \bar{A}C + BC + BC$ identity + commutative

$= \bar{A}C + BC + BC$ absorbtion

$= \bar{A}C + BC$ idempotent

$= C(\bar{A}+B)$ distribute

$= C(\bar{A}(B+\bar{B}) + B)$ idempotent

$= C(\bar{A}B + \bar{A}\bar{B} + B)$ distribute

$= C(\bar{A}\bar{B} + B)$ absorb

A	B	AB	A+B
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	1

given $AB=0$ and $A+B=1$, we know one value is zero, and the other is one. Therefore, $\bar{A}\bar{B}$ must be equal to 01 or 10. Thus, $\bar{A}\bar{B}=0$

$= C(0+B)$

$= BC$