1. Simplify the following expressions using Boolean algebraic laws. Give each step of your simplification and denote which laws you're using for each step. Do not skip or combine steps!

   (a) $A \cdot (A + B \cdot B) + (B + A) \cdot (A + B)$

$A \cdot (\overline{A} + BB) + \overline{(B + A)} \cdot (\overline{A} + B)$	Demorgan's Law
$A \cdot (\overline{A} + BB) + (\overline{B} \cdot \overline{A}) \cdot (\overline{A} + B)$	Idempotent Law
$A \cdot (\overline{A} + B) + (\overline{B} \cdot \overline{A}) \cdot (\overline{A} + B)$	Distributive Law
$(\overline{A} + B)(A + \overline{B} \cdot \overline{A})$	Distributive Law
$(\overline{A} + B)(A + \overline{B} \cdot A + \overline{A})$	Inverse Law
$(\overline{A} + B)(A + \overline{B} \cdot 1)$	Identity Law
$(\overline{A} + B)(A + \overline{B})$	Distributive Law
$(\overline{A} + B)A + (\overline{A} + B)\overline{B}$	Distributive Law
$A\overline{A} + AB + \overline{A} \cdot \overline{B} + \overline{B}B$	Inverse Law
$0 + AB + \overline{A} \cdot \overline{B} + 0$	Identity Law
$AB + \overline{A} \cdot \overline{B} + 0$	Identity Law
$AB + \overline{A} \cdot \overline{B}$	

   (b) $\overline{C \cdot B} + A \cdot B \cdot C + \overline{A + C + \overline{B}}$

$\overline{C}\overline{B} + ABC + \overline{A + C + \overline{B}}$	Demorgan's Law
$(\overline{C} + \overline{B}) + ABC + \overline{A + C + \overline{B}}$	Demorgan's Law
$\overline{C} + \overline{B} + ABC + \overline{A} \cdot \overline{C}B$	Commutative Law
$\overline{C} + \overline{B} + ABC + \overline{A}AB\overline{C}$	Absorption Law
$(\overline{C} + \overline{B}) + ABC$	Absorption Law
$(\overline{C} + \overline{B}) + AB$	Absorption Law
$(\overline{C} + \overline{B}) + A$	Absorption Law

   (c) $(A + B) \cdot (\overline{A} + C) \cdot (\overline{C} + B)$

$(A+B)(\overline{A}+C)(\overline{C}+B)$	Distributive Law
$(A+B)(\overline{A}+C)\overline{C}+(A+B)(\overline{A}+C)B$	Distributive Law
$(A+B)(\overline{A}\cdot\overline{C})+(A+B)(C\overline{C})+(A+B)(\overline{A}+C)B$	Inverse Law
$(A+B)(\overline{A}\cdot\overline{C})+(A+B)(0)+(A+B)(\overline{A}+C)B$	Zero and One Law
$(A+B)(\overline{A}\cdot\overline{C})+(A+B)(\overline{A}+C)B$	Distributive Law
$(A+B)(\overline{A}\cdot\overline{C})+(\overline{A}+C)(AB)+(\overline{A}+C)(BB)$	Idempotent Law
$(A+B)(\overline{A}\cdot\overline{C})+(\overline{A}+C)(AB)+(\overline{A}+C)(B)$	Distributive Law
$A\overline{A}\cdot\overline{C}+\overline{A}B\overline{C}+(\overline{A}+C)(AB)+(\overline{A}+C)(B)$	Inverse Law
$0\overline{C}+\overline{A}B\overline{C}+(\overline{A}+C)(AB)+(\overline{A}+C)B$	Zero and One Law
$\overline{A}B\overline{C}+(\overline{A}+C)(AB)+(\overline{A}+C)B$	Distributive Law
$\overline{A}B\overline{C}+\overline{A}AB+ABC+(\overline{A}+C)B$	Inverse Law
$\overline{A}B\overline{C}+0B+ABC+(\overline{A}+C)B$	Zero and One Law
$\overline{A}B\overline{C}+ABC+(\overline{A}+C)B$	Distributive Law
$\overline{A}B\overline{C}+ABC+\overline{A}B+BC$	Commutative Law
$\overline{A}B+BC+ABC+\overline{A}B\overline{C}$	Absorption Law
$\overline{A}B+BC+ABC$	Absorption Law
$\overline{A}B+BC+AB$	Absorption Law
$\overline{A}B+BC+A$	Absorption Law
$\overline{A}B+BC$	

2. Find all solutions of the following Boolean equations without using the truth tables: