Digital Logic Design Exercise

Boolean Algebra and Logic Simplification

Using Boolean Algebra, simplify the following expressions using a step by step approach where only one simplification is made per step. Identify the specific Rule or Law used each time.

1. *AB + A(B + C) + B(B + C)*
2. *[A$\bar{B}$(C + BD) + $\bar{A}\bar{B}$]C*
3. *$\bar{A}$BC + A$\bar{B}\bar{C}$ + $\bar{A}\bar{B}\bar{C}$ + A$\bar{B}$C + ABC*
4. $\overline{\bar{A}B + A\bar{C}}$ + $\bar{A}\bar{B}$C

Implement the following expressions as stated with the appropriate logic gates. Then implement the simplified expression and compare the number of gates.

5. *A + AB + A$\bar{B}$C*
6. *($\bar{A}$ + B)C + ABC*
7. *A$\bar{B}$C(BD + CDE) + A$\bar{C}$*