Examples of use of Boolean algebra theorems and identities to simplify logic expressions.

Find minimal SOP expressions for the following:

1. $Z=AD+BCD+\bar{A}C$
Use consensus theorem ($PQ+\bar{P}R= PQ+\bar{P}R+QR$)
Apply to $AD+\bar{A}C$ to add CD which will serve as a "hit-man".
$Z=AD+BCD+\bar{A}C+CD$
Then apply absorption identity ($P+PQ=P$) to $CD+BCD$ to get
$Z=AD+ \bar{A}C+CD$
Now use the consensus theorem in reverse to get rid of the hit-man CD.
$Z=AD+ \bar{A}C$

2. $Z=AB(\bar{A}CD+AE+EG)$
Multiply out to get
$Z=AB\bar{A}CD+ABAE+ABEG$
Simplify using $P\bar{P}=0$ and $PP=P$
$Z=ABE+ABEG$
Use absorption identity to get final result
$Z=ABE$

3. (A more complicated problem is)
$Z=ABC+A\bar{B}CE+ACDE+\bar{A}\bar{B}D+\bar{B}CDE$
Use consensus theorem on $ABC+A\bar{B}CE$ to add the consensus term ACE
$Z=ABC+A\bar{B}CE+ACDE+\bar{A}\bar{B}D+\bar{B}CDE$