2)

a)In order to have 12V output voltage with the input voltage of 16V in a buck boost converter

When the switch is ON L1 charges by input source. Therefore,

When the switch is OFF, voltage drop on L2 is equal to -VO. So it discharges with -VO.

b)

Diagram

Description automatically generated

Figure x: Capacitor Charging Graph

C2 charges up when IL2 is larger than average output current. Area of ΔQ is;

C1 charges up by a constant current, therefore;

Notice that for ΔV for C1 is 12+16 = 28V. Therefore, using the equation above one can find C1 as