Solution to part 4(c)

If 2 and 3 are grounded, \( C_{25} \) and \( C_{35} \) are irrelevant. The full is the effective circuit:

This is further reduced to:

\[
C_{eff}^{15} = C_{21} \parallel C_{10} \parallel C_{31} \quad \text{('\parallel' refers to capacitances in parallel)}
\]

\[
C_{eff}^{45} = C_{43} \parallel C_{45} \parallel C_{42}
\]
The effective capacitance between 1 and 4 is therefore:

\[
C_{14} \parallel \left( C_{15}^{\text{eff}} \text{ series } C_{45}^{\text{eff}} \right) \quad \text{["series" means the capacitances are in series]}
\]

Calculation of \( C_{15}^{\text{eff}} \) and \( C_{45}^{\text{eff}} \):

\[
C_{15}^{\text{eff}} = C_{21} + C_{15} + C_{31} = 2.162 \, \text{fF}
\]

\[
C_{45}^{\text{eff}} = C_{43} + C_{45} + C_{42} = 1.472 \, \text{fF}
\]

Thus \( C_{15}^{\text{eff}} \) series \( C_{45}^{\text{eff}} \) is

\[
\frac{C_{15} - C_{45}}{C_{15} + C_{45}} = 0.876 \, \text{fF}
\]

So, net capacitance between nodes 1 and 4 is

\[
C_{14} + 0.876 = 1.612 \, \text{fF}
\]