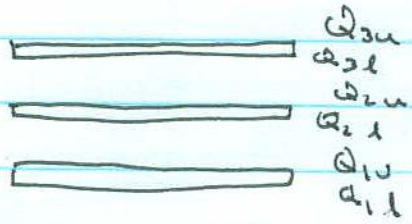
4-2



6 unknowns (Q_{1u}, Q_{1l}, Q_{2u}, Q_{2l}, Q_{3u}, Q_{3l}).

Using charge conservation:

$$Q_{1u} + Q_{1l} = 1\,C$$
$$Q_{2u} + Q_{2l} = 4\,C$$
$$Q_{3u} + Q_{3l} = 7\,C$$

Next, apply Gauss' Law using a cylinder to stass in conductor 1 and ends in conductor 2:

$$\oint \vec{E} \cdot d\vec{A} = 0 \quad \text{since} \quad \vec{E} = 0$$

$$Q_{1u} + Q_{2l} = 0$$

$$Q_{2u} + Q_{3l} = 0$$

$$Q_{3u} + Q_{1l} = 0$$

similarly

Gives $Q_{1l} = 6\,C$ $\quad Q_{1u} = -5\,C$

$Q_{2l} = 5\,C$ $\quad Q_{2u} = -1\,C$

$Q_{3l} = 1\,C$ $\quad Q_{3u} = 6\,C$