SUMMARY FOR TEST 3

Conductors:

- $V = \text{const}$, $\vec{E} = 0$ inside, ...
- apply $\oint \vec{E} \cdot d\vec{a} = \frac{Q_{encl}}{\varepsilon_0}$
- $C = \frac{Q}{\Delta V} = \frac{Q}{V_+ - V_-}$

Uniqueness Thms: apply (not proof)

↓

show that solution satisfies boundary conditions (b.c.)

Method of Images

Sketches: Fig. 1, Fig. 2 (image(s))

& show that b.c. satisfied

$V = \ldots$

$\vec{F}_{on\,q}$

$$\sigma = -\varepsilon_0 \left(\frac{\partial V^{above}}{\partial n} - \frac{\partial V^{below}}{\partial n} \right) \Bigg|_{\text{at surface}}$$

$$q_{induced} = \int \sigma \, da$$

Separation of Variables:

Sketch

$V = X(x)\,Y(y)\,Z(z)$ $\quad R(r)\,\Phi(\phi)\,\Theta(\theta)$ ...

$\nabla^2 V = 0$ & separate variables

solve DE (see Eq. sheet for what is provided)

Apply b.c. one by one (last via direct comparison or Fourier's Trick)

plug back into $V = \ldots$

$\sigma = \ldots$

$\vec{F} = q\vec{E} = -q\vec{\nabla} V$