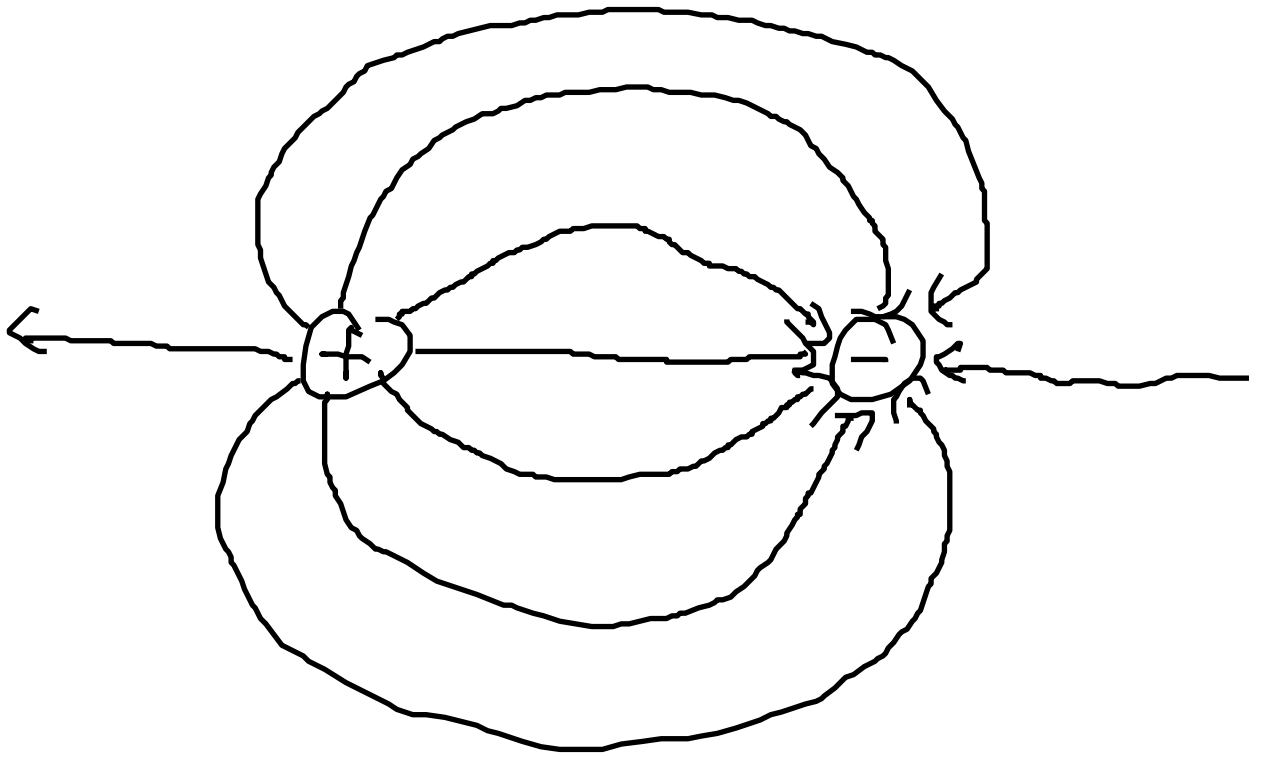
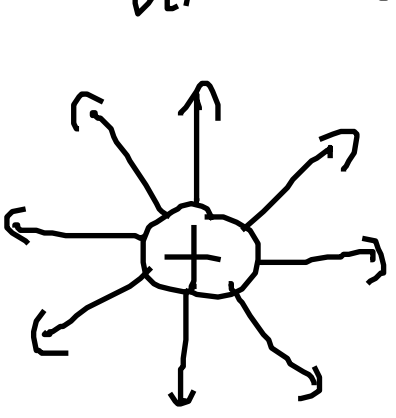
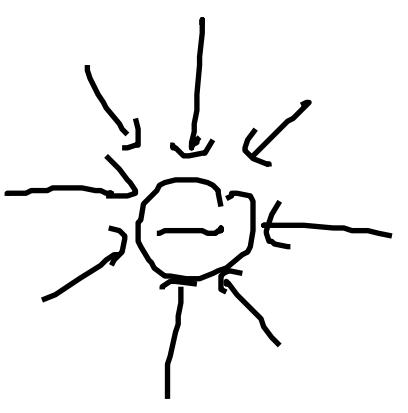
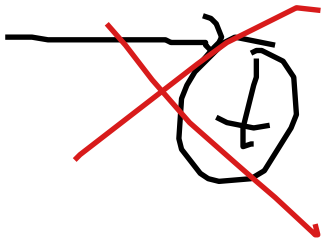


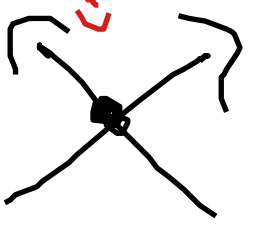
- $\vec{E}$ is tangent to field lines at all points
- Field lines always have a direction
- Emerge from positive sources,
- Terminate at negative sources
- Close to a point charge, they are radial







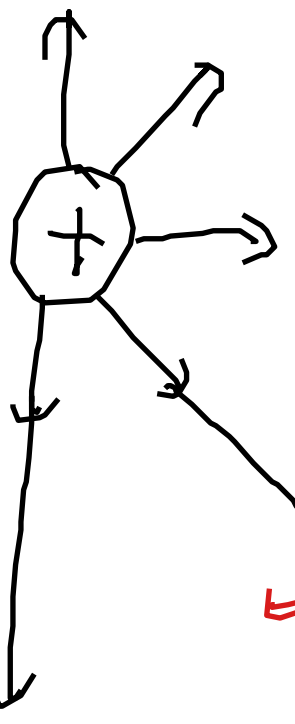
E? would have to have two values no!



- Field lines never cross

- Field line diagrams show the total electric field of all sources

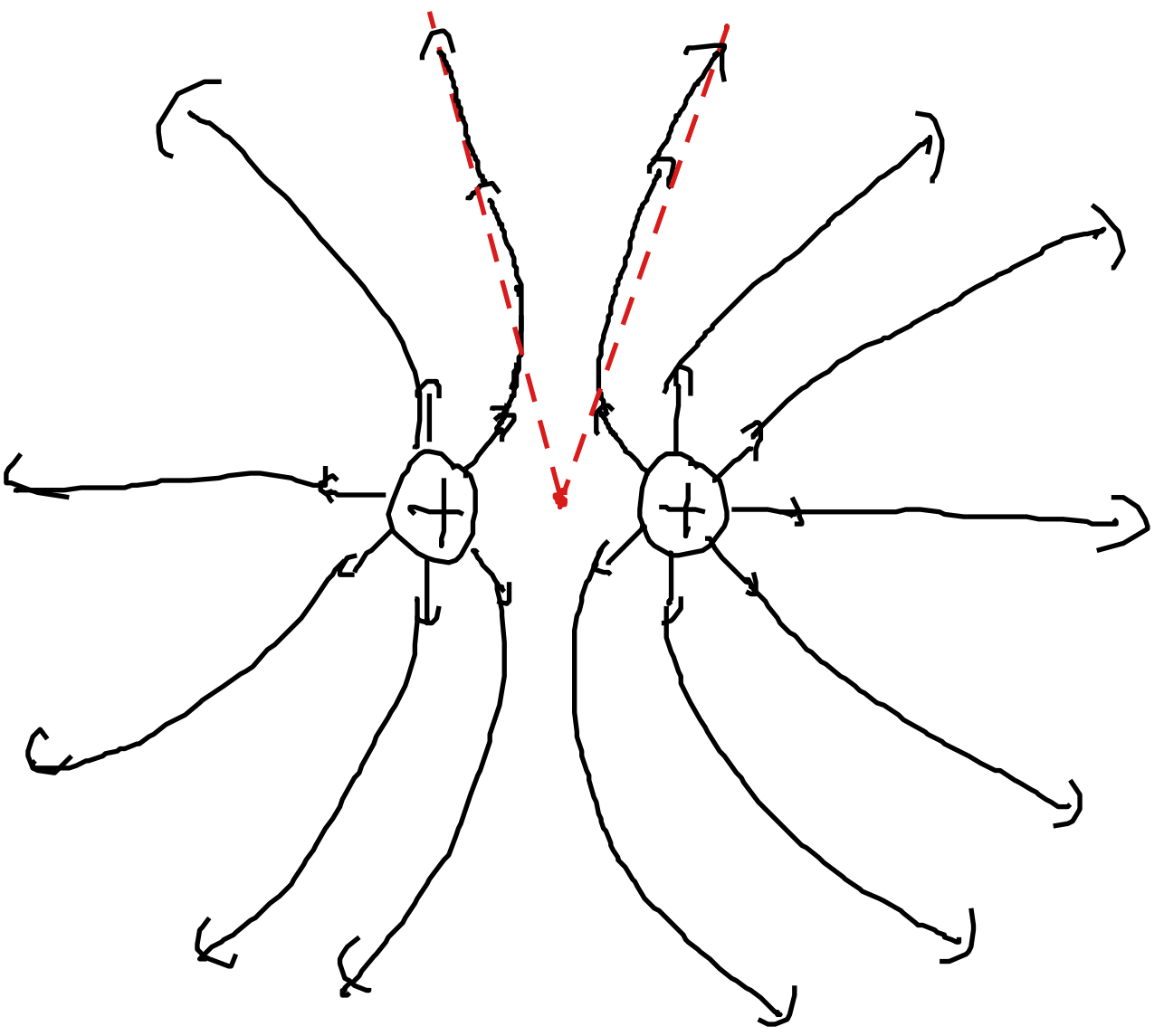
- denser the field lines, the stronger the field



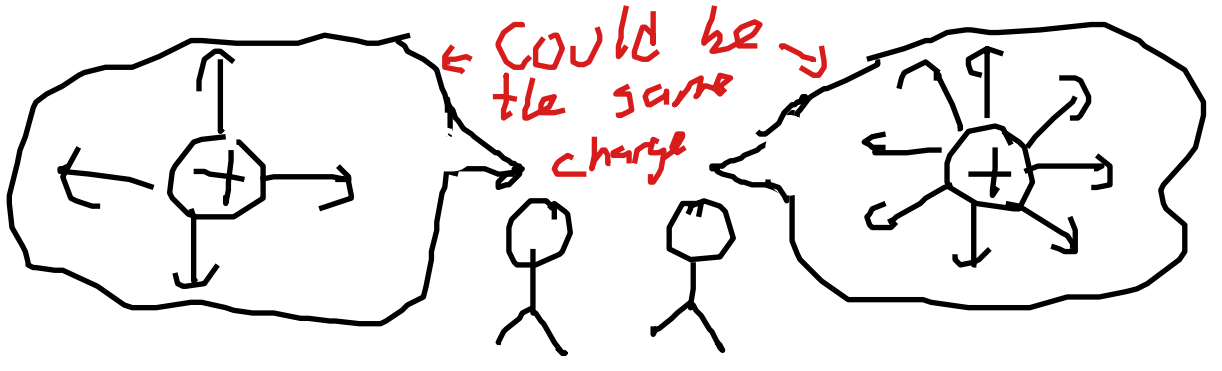
close together, strong field

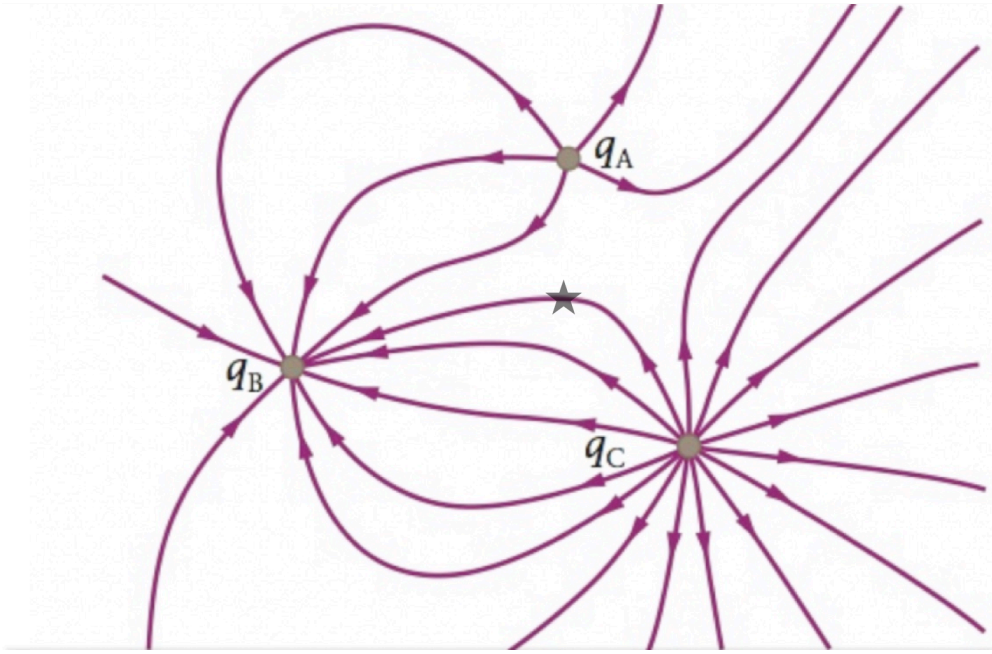
far apart, weak field

- far away from a set of charges, field lines look like that of a single charge unless $Q_{tot} = 0$



- on same field line diagram, larger charges have more field lines

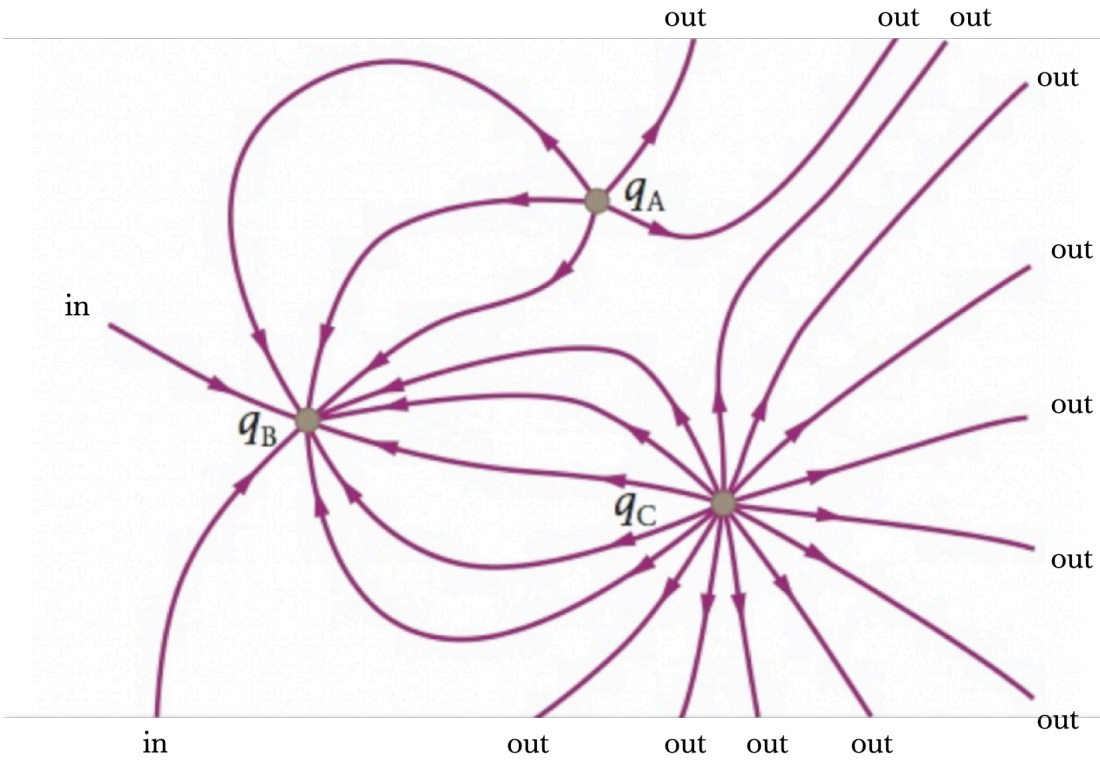




Which charges are positive?
A or C because the field lines emerge from them

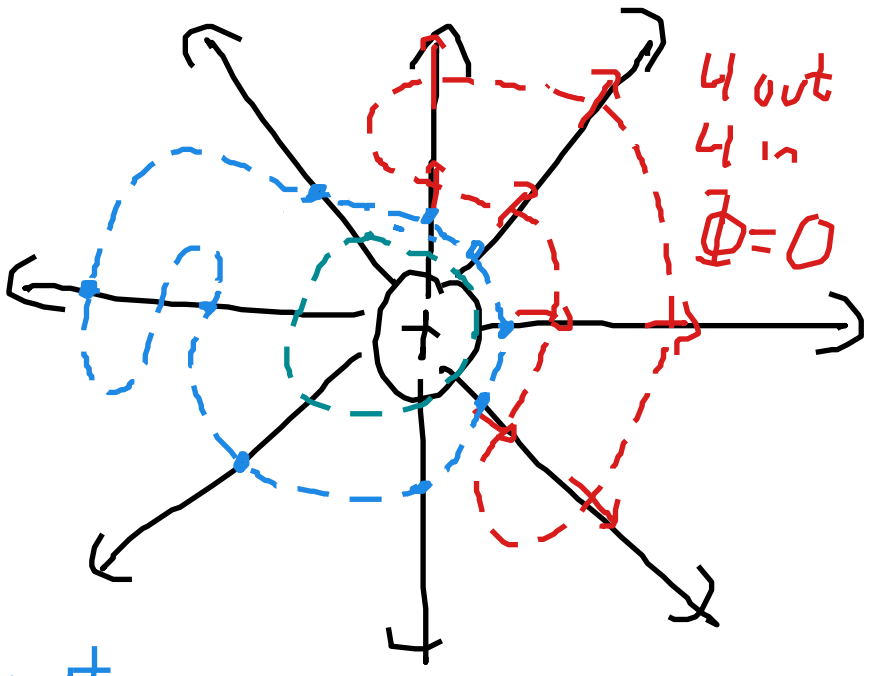
What is the direction of the electric feild at the star?
To the left, because that's tangent to the electric field line

Which charge has the smallest magnitude?
A because it has the fewest lines coming out of it



What is the net charge of the total?
There are more lines out than in, so far away the field lines will look like the field lines of a positive charge. Thus **positive.**

Gauss' Law



Electric flux

Φ ~ # lines out − # lines in

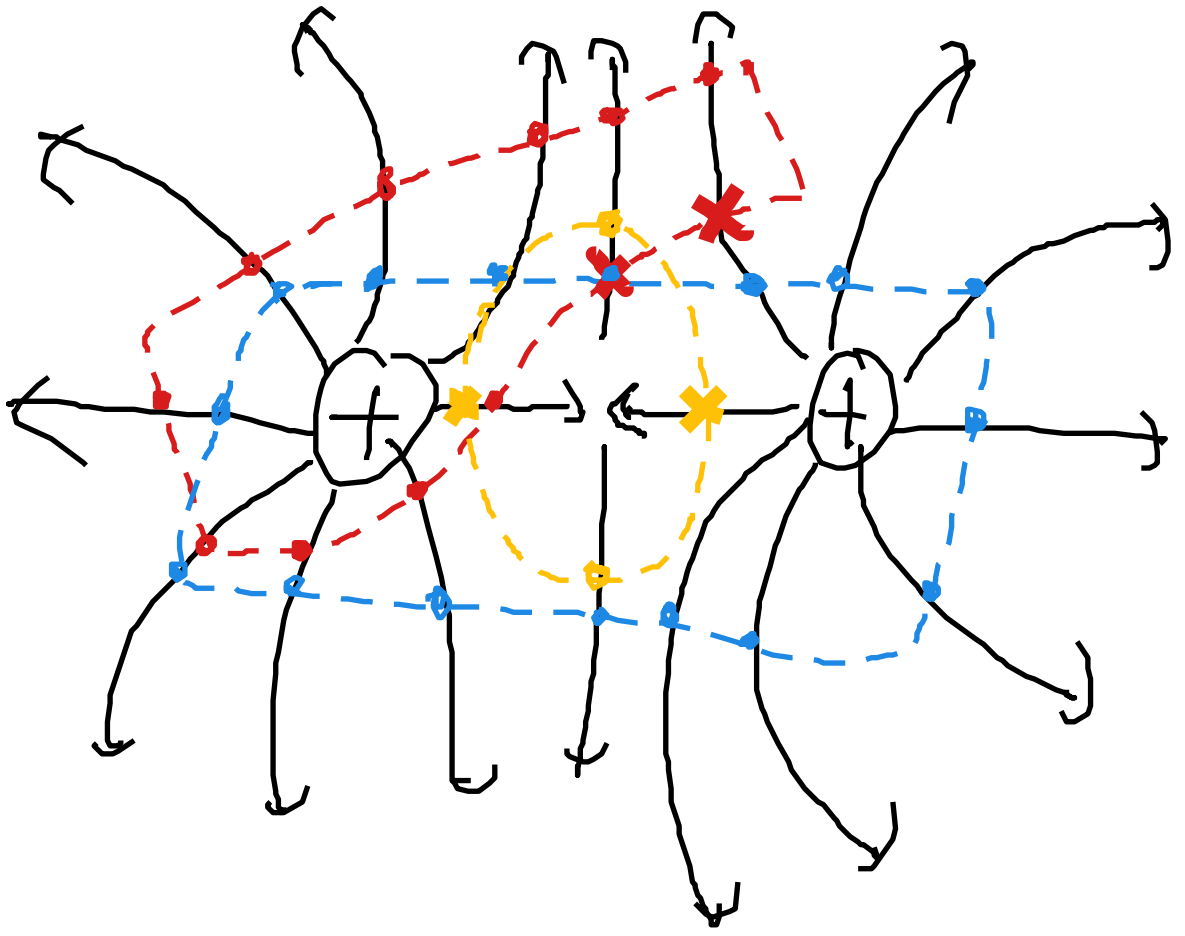
phi

q out

− q in

$\Phi = 0$

Electric flux through a closed surface is proportional to the net charge inside that surface.



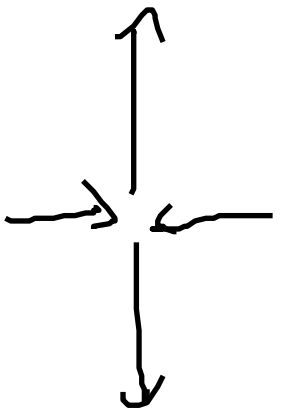
$\Phi = 10 - 2 = 8$

$\Phi = 16 - 0 = 16$

twice the flux, twice the charge

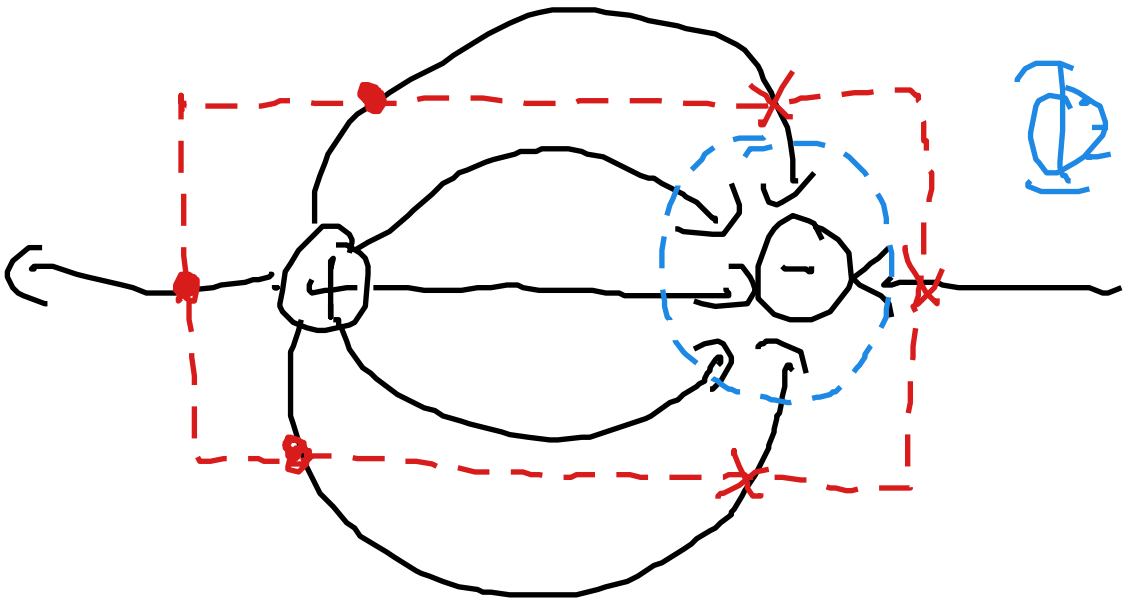
$\Phi = 2 - 2 = 0$

no charge inside



"saddle point"

$\vec{E} = 0$,



$\oint 0 \cdot 6 = -6$

$\oint = 3_{out} - 3_{in} = 0$