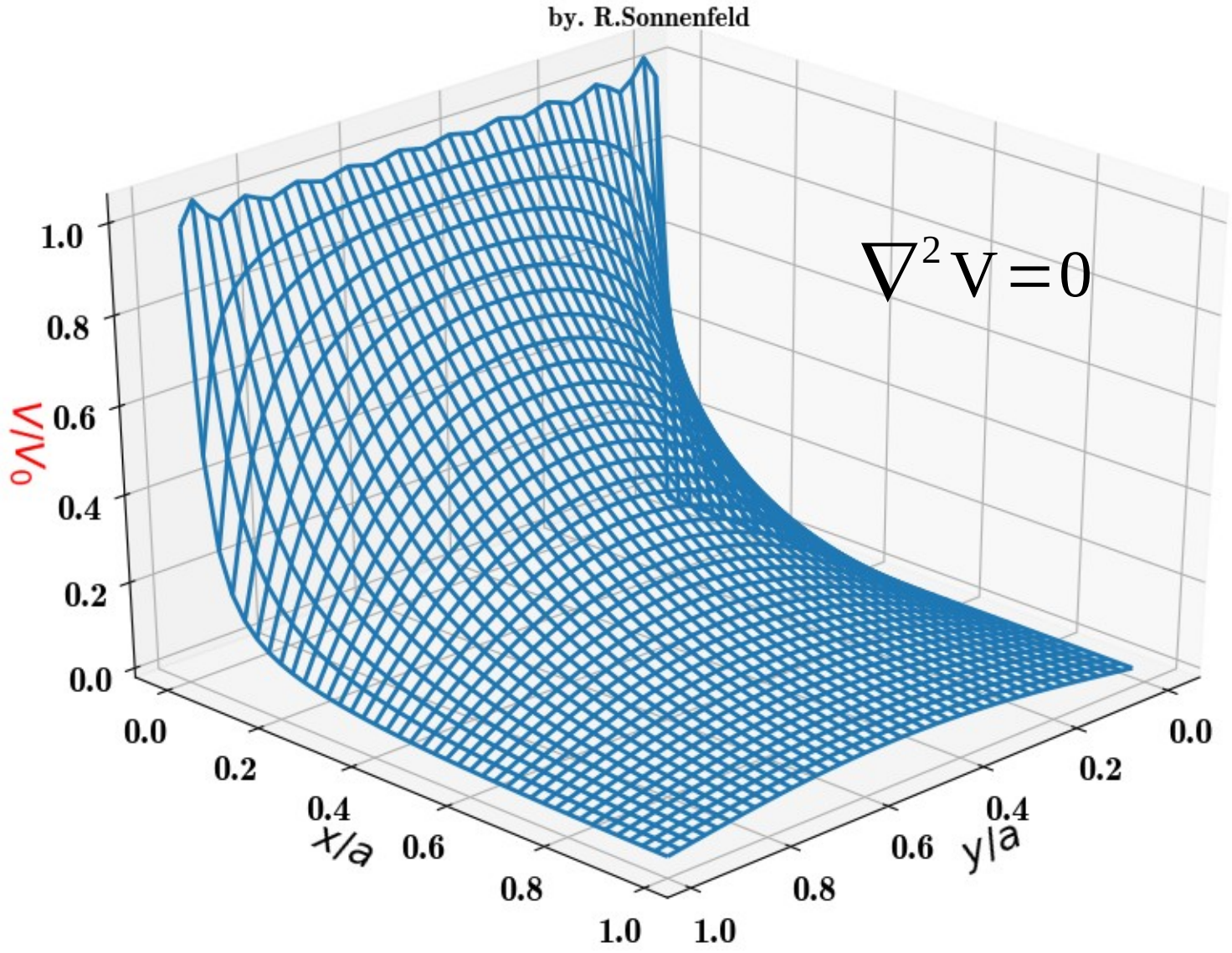
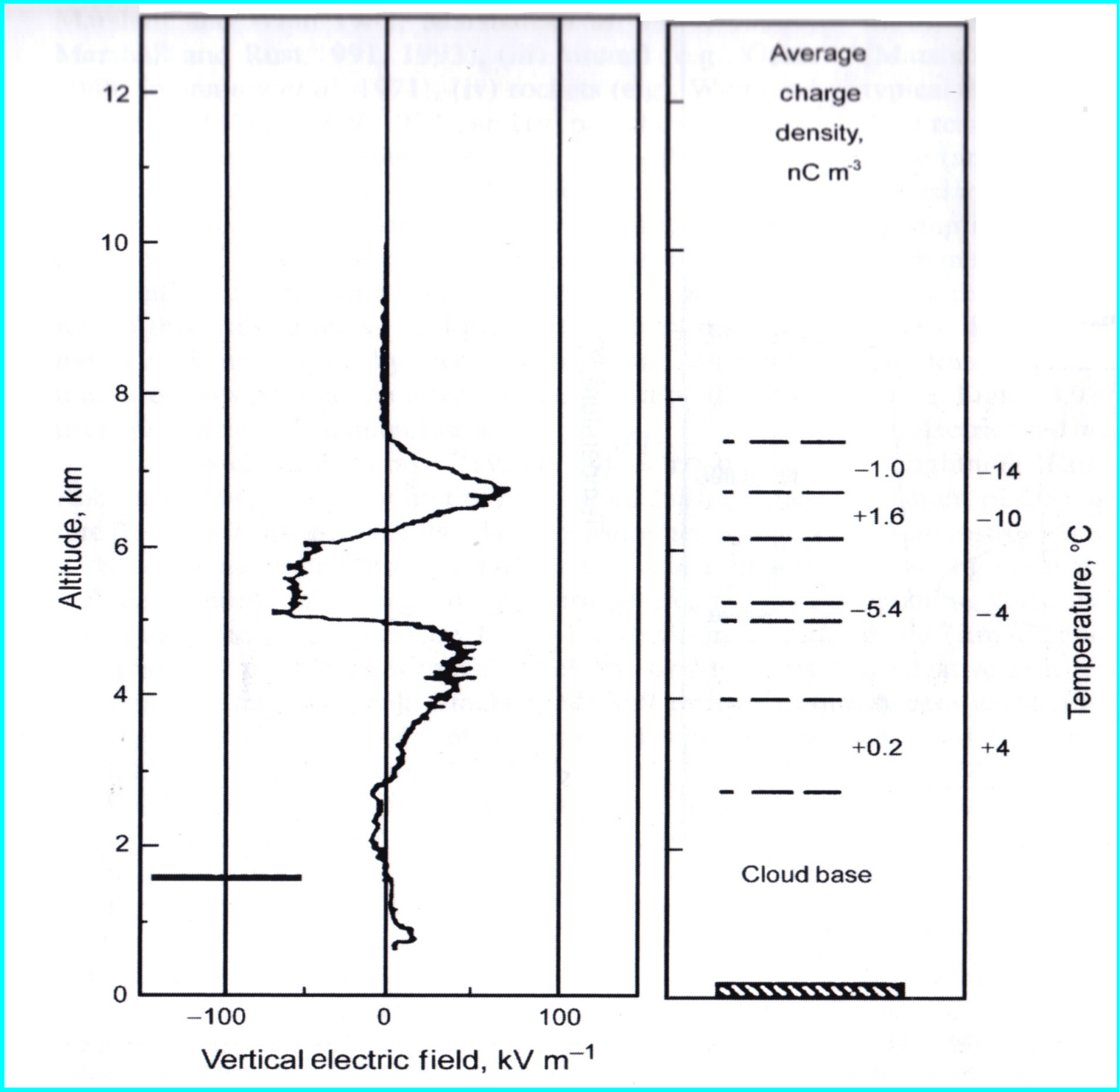
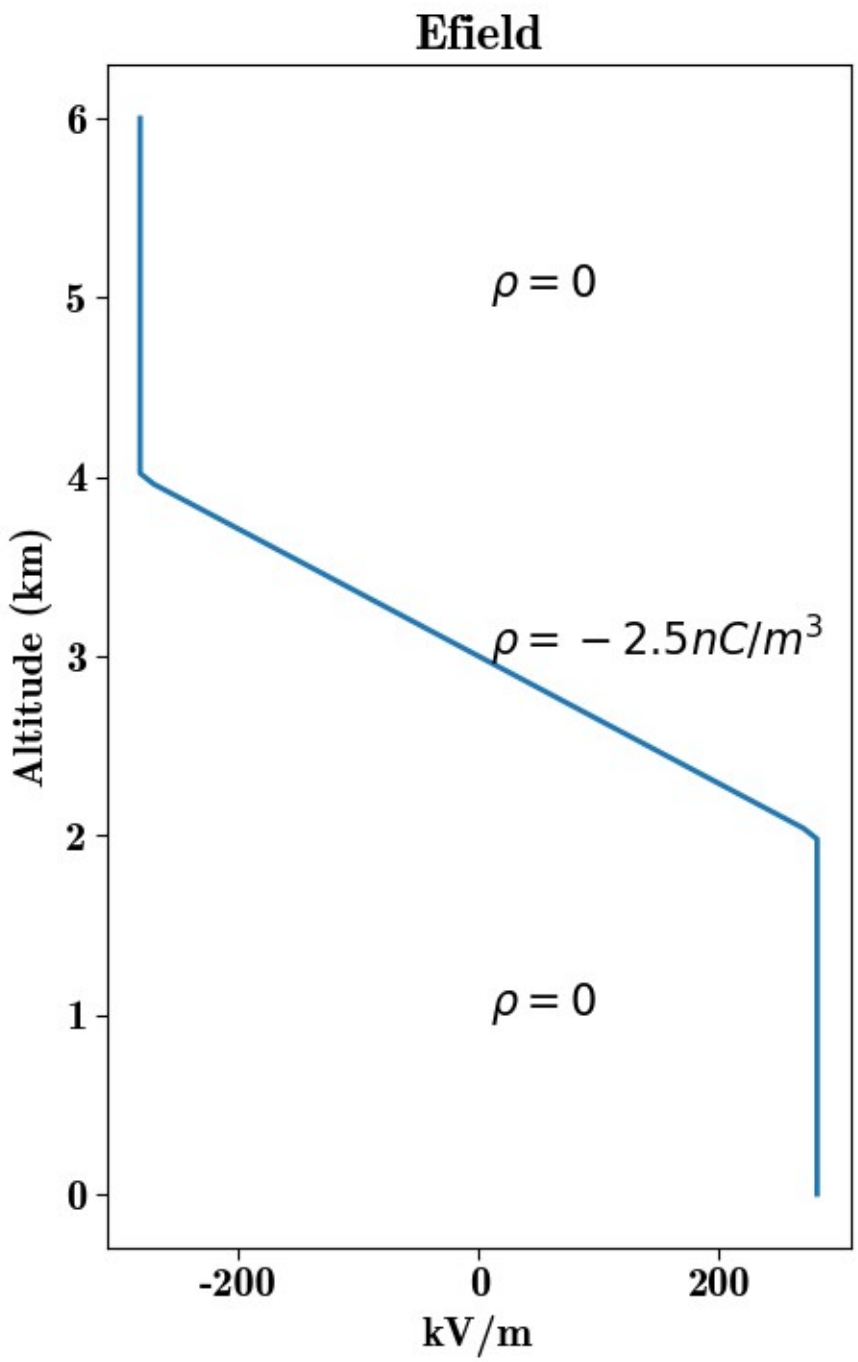
Griffiths Figure 3.18

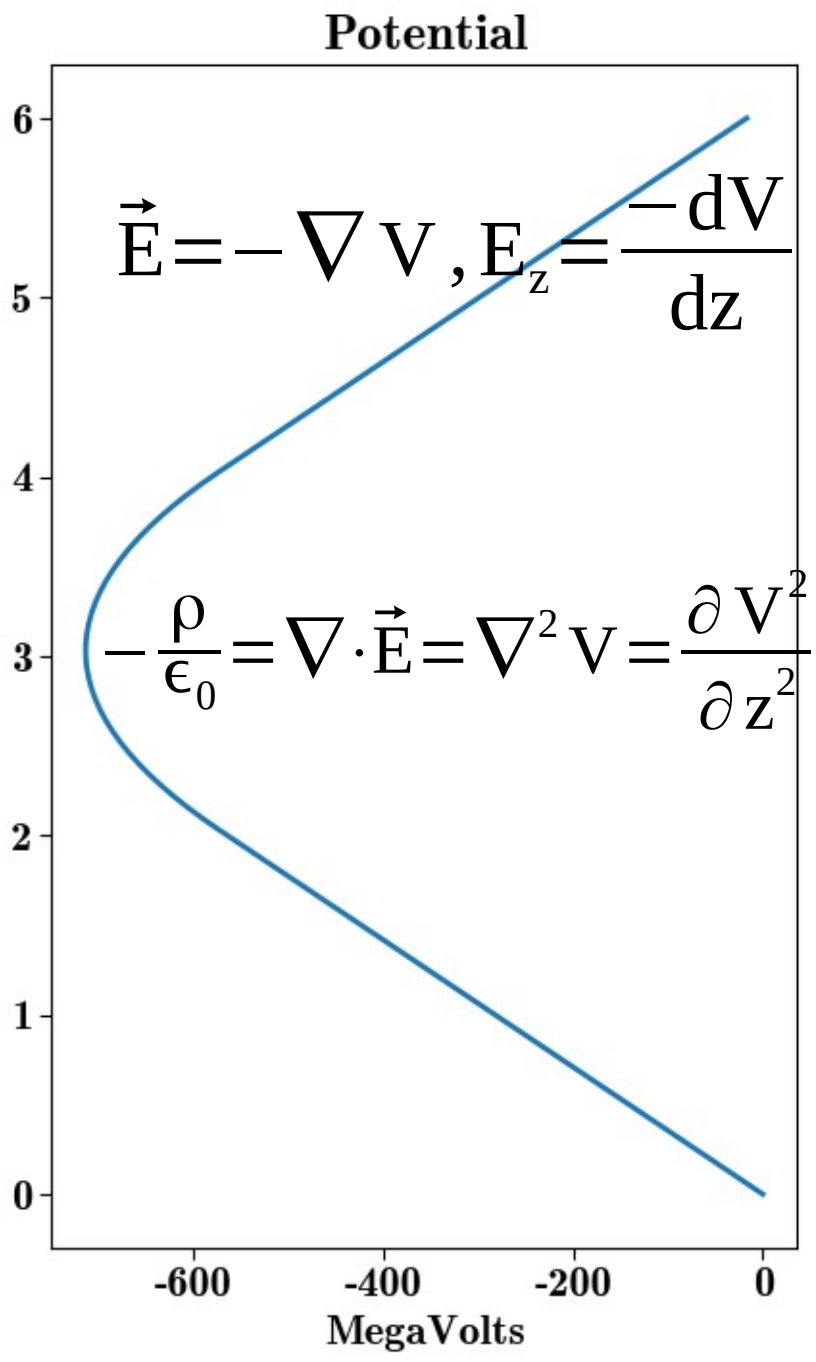



– 40 °C
~ 8 km
0 °C


Altitude, km
12
10
8
6
4
2
0
−100
0
100
Vertical electric field, kV m−1
Average
charge
density,
nC m-3
−1.0
+1.6
−5.4
+0.2
Cloud base
−14
−10
−4
+4
Temperature, °C

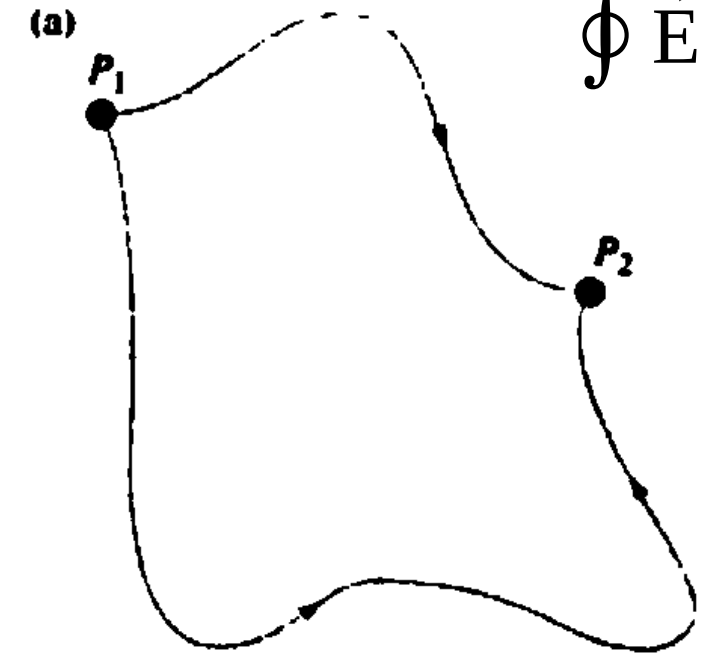
Field and Potential of a Charge Layer

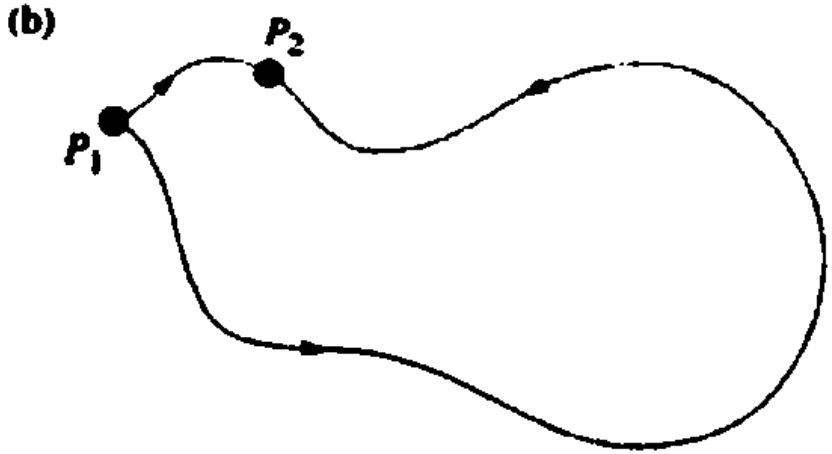


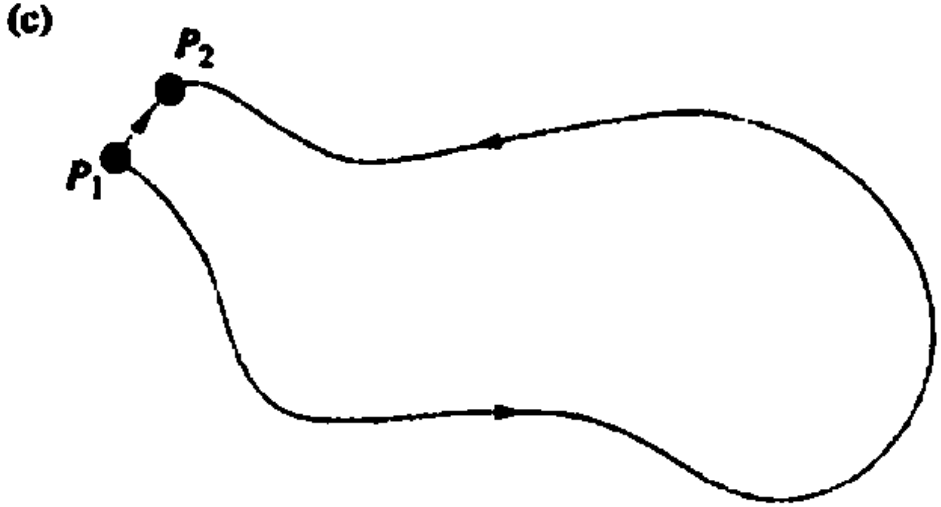


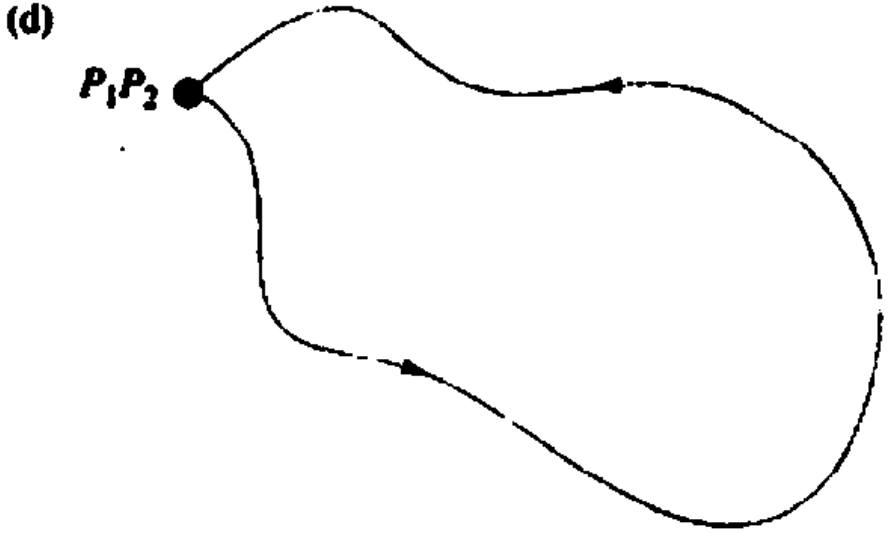
Path independence also means $\oint \vec{E}\cdot d\vec{l}=0$

$$\oint \vec{E}\cdot d\vec{l}=0 \rightarrow \nabla\times\vec{E}=0$$









Find the approximate electric field 1 cm above a 2 m x 2 m square uniformly charged flat plate. The total plate charge is 10 nC.

A) $E \sim 4 \times 10^{-20}\,V/m$

B) $E \sim 14 \times 10^{-8}\,V/m$

C) $E \sim 1\,V/m$

D) $E \sim 140\,V/m$

E) $E \sim 10 \times 10^{6}\,V/m$

Find the approximate electric field 10 m above a 2 m x 2 m square uniformly charged flat plate. The total plate charge is 10 nC.

A) $E \sim 4 \times 10^{-20}\,V/m$

B) $E \sim 14 \times 10^{-8}\,V/m$

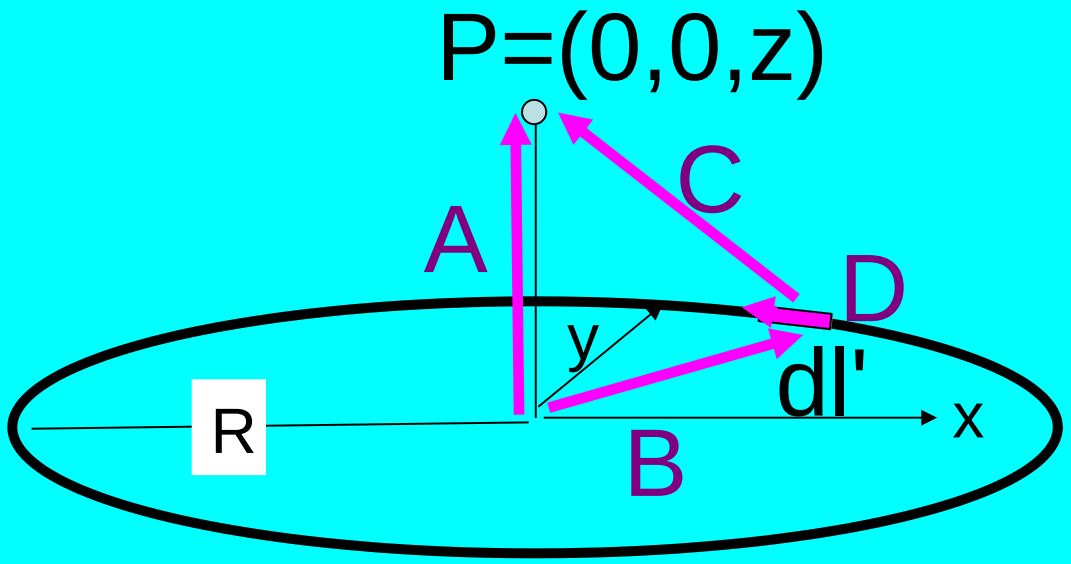
C) $E \sim 1\,V/m$

D) $E \sim 140\,V/m$

E) $E \sim 10 \times 10^{6}\,V/m$

Find E-field at P from a thin ring (uniform charge density λ)

What do we use for $\vec{r}$?



E) None of the arrows represents $\vec{r}$