

## Problem

An infinite plane in empty space carries a uniform surface charge  $\sigma$ . Find the electric field.

## Solution:

Draw a Gaussian 'Pillbox' extending equal distances above and below the plane:

Apply Gauss's law to the box.

$$\oint E \cdot da = \frac{1}{\epsilon_0} Q_{enc}$$

In this case  $Q_{enc} = \sigma A$  where  $A$  is the area of the lid of the 'pillbox'.

$$\int E \cdot da = 2A/E$$

The sides contribute nothing.

$$E = \frac{\sigma}{2\epsilon_0} \hat{n}$$