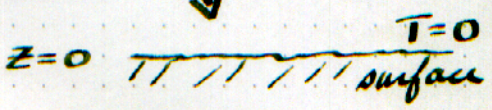
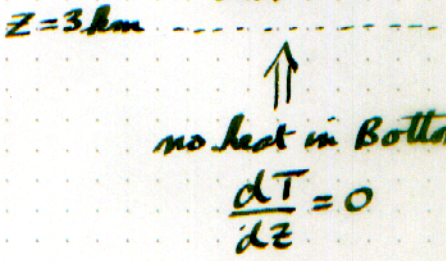
Our problem, 1D heat-production in the earth



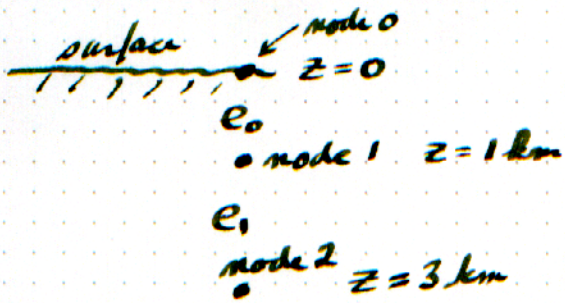
Governing eqn

$$K\frac{d^2T}{dz^2} + q = 0$$

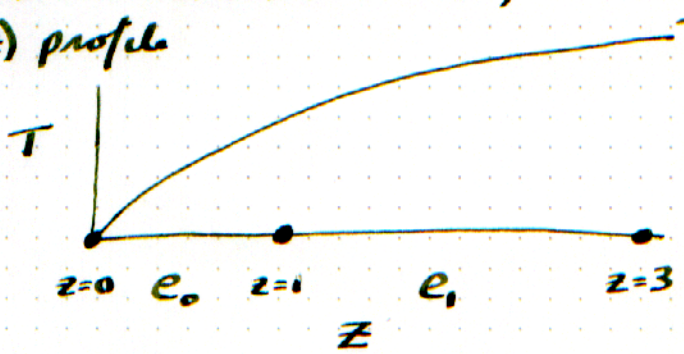
K conduction = const
q radioactive heat = constant



divide up our domain into 2 subregions (called Finite Elements e_0, e_1)



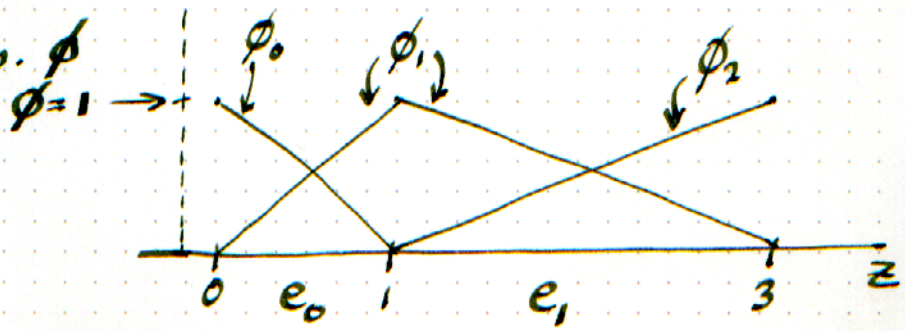
Sketch our domain on its side, an include our expected (unknown) T(z) profile



we will fit our approx. fn $\hat{T}(x)$ as a solution to the problem by making $\hat{T}(x)$ a piece-wise linear sum of <u>weighted</u> basis functions

For basis functions we choose simple linear functions over the sub-domain elements.

Basis fns. ϕ



$\phi_0 = 1-x \quad 0 \le x \le 1$
$= 0 \quad x > 1$
(all these 'x' should be 'z')

$\phi_1 = x \quad 0 < x \le 1$
$= \frac{3}{2} - \frac{x}{2} \quad 1 \le x < 3$
$= 0 \quad x < 0, \; x > 3$

$\phi_2 = -\frac{1}{2} + \frac{x}{2} \quad 1 \le x < 3$
$= 0 \quad x < 1$