Suppose we have a crustal model with exponential decrease in heat producing elements in the upper 10 kilometers and constant heat production below that. First we need a couple constants and a range of depths to calculate the geotherms; Ao is heat production at the surface, k is thermal conductivity, qb is heat flow from the mantle, the crust will be 35 km thick:

$Ao := 2.5\cdot 10^{-6}\cdot\frac{watt}{m^3}$ $\quad k := 2\cdot\frac{watt\cdot deg}{m}$ $\quad z := 0\cdot km, 1\cdot km .. 35\cdot km$ $\quad qb := .02\cdot\frac{watt}{m^2}$

$D := 10\cdot km$ $\quad H := 10\cdot km$ $\quad A(z) := Ao\cdot e^{-\frac{z}{D}}$ $\quad A(10\cdot km) = 9.197\cdot 10^{-7}\,\frac{watt}{m^3}$

First, assuming a steady state situation, calculate the heat flow out of the surface; q(surf) = qb + q(slab) +q(exp). Heat flow from the top of the 10 km slab with constant A=A(10 km) is qslab:

$qslab := 25\cdot km\cdot A(10\cdot km)$ $\quad qslab = 0.023\,\frac{watt}{m^2}$

Heat flow from the section with exponentially decreasing heat production is qexp: $qexp := Ao\cdot D\cdot\left(1 - e^{-\frac{H}{D}}\right)$

So the total heat flow at the surface is qo: $qo := qb + qslab + qexp$ $\quad qo = 0.059\,\frac{watt}{m^2}$

Next, calculate the temperature at the base of the 10 km thick zone that has exponentially decreasing heat production with depth.

$z := 0\cdot km, 1\cdot km .. 10\cdot km$ $\quad Te(z) := \left[\frac{Ao\cdot D}{k}\cdot\left(D - D\cdot e^{-\frac{z}{D}} - z\cdot e^{-\frac{H}{D}}\right) + \frac{qb + qslab}{k}\cdot z\right]\cdot deg$ $\quad Te(10\cdot km) = 247.992$

Now calculate the temperature profile in a 25 km slab beneath the exponential section. We'll use the heat production at 10 km for the constant heat production value throughout the remainder of the crust.

$H := 25\cdot km$ $\quad zs := 0\cdot km, 1\cdot km .. 25\cdot km$ $\quad Ts(z) := Te(10\cdot km) + \left[\frac{A(10\cdot km)}{k}\cdot\left(H\cdot z - \frac{z^2}{2}\right) + \frac{qb}{k}\cdot z\right]\cdot deg$

For the whole crust, use a LOGICAL IF statement to combine the graphs for Ts(z) and Te(z):

$Ttot(z) := if(z \le 10\cdot km, Te(z), Ts(z - 10\cdot km))$ Now fudge some things to get the graph units correct:

$z := 0\cdot km, 1\cdot km .. 35\cdot km$