The steady state temperature field for a nuclear waste canister buried at depth can be represented by the diagram shown below:

\[ T = 10^\circ C \]

\[ \text{geothermal gradient} = \frac{25^\circ C}{\text{km}} \]

The governing equation for this situation is:

\[ \frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} + \frac{A}{k} = 0 \]

for the x, y point of canister, where \( A = 50 \text{ Wm}^{-3} \) and \( k = 10 \text{ Wm}^{-1} \text{ }^\circ \text{C}^{-1} \)

For all other parts of the domain, the governing equation is simply:

\[ \frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} = 0 \]

(a). Write out the 2-dimensional finite difference formulation of the governing equation, and the appropriate boundary conditions assuming that the radioactive canister is placed in the central part of the domain.

(b). Write a computer code of your finite difference formulation that solves the temperature field for this problem.