Ajani Mnyandu – Exercise 11

1. The next two lines after the comment #Question 1 in the code set the boundary conditions for the numerical solution. T[0,n+1] = T0 and T[-1,n+1] = T0 set the temperature at the first and last grid points to a constant value T0. This is done to enforce boundary conditions such as zero flux or fixed temperature at the boundaries.

2. Line #L1 implements the spatial discretization of the advection equation using a centered difference scheme. It calculates the right-hand side (rhs) of the advection equation, which represents the spatial gradient of temperature. Line #L2 updates the temperature values at interior grid points using the forward Euler method, where T[1:-1,n+1] represents all interior grid points excluding the boundary points.

3. The code does not perform the computation on all elements of the array T because the boundary conditions are set separately. Therefore, the loop only updates the temperature values for the interior grid points.

4. The numerical solution differs from the expected moving perturbation due to stability issues, as the numerical solution diverges from the analytical solution as time evolves.