Physics 451   Special   Problem   on   the   Heat   Equation   Spring   2008

Name _____

Consider a metal rod whose two ends are embedded in blocks of ice. Initially, the temperature profile along the rod is *u(x,0) = sin(π·x)*. The rod lies along the x-axis. Remember to use a suitable Δx and Δt.

i)   Write a Fortran program to compute the temperature profile along the rod at a later time, *t*.

ii)   Plot the temperature profile on the monitor screen at each time-step. If the plot is erased each time before plotting the profile at the next time-step, an animation of the "heat flow" will be produced.

iii)   Discuss what is meant by the phrase "suitable Δx and Δt." That is, what considerations influence the choice of numerical values for Δx and Δt?