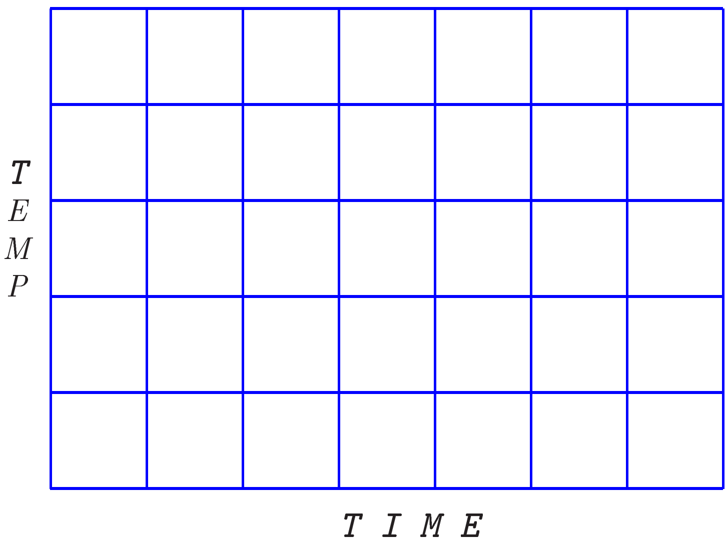
Going from numerical to graphical and back again

More often than not, when we collect data, it is done numerically. For example, we might measure the temperature in a room at various times during a given time interval. The data here is a set of ordered pairs of the form (time,temperature). It is natural to plot the data on some Cartesian coordinate paper to get a feel for what happened to the temperature in the room over the time period in question. After we have plotted the data points, we might interpolate the data, that is, sketch in a plausible graph of the temperature function for the room during the time interval that data was collected.

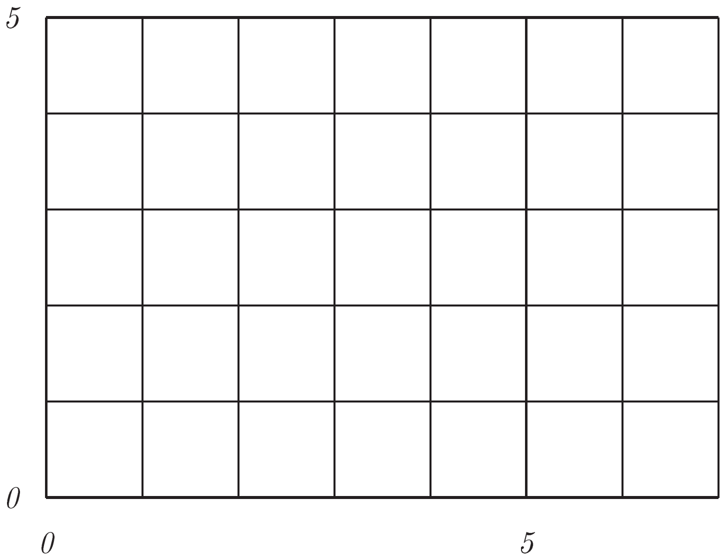
Problem 1 *Here are some time and temperature measurements taken in a room.*

time t (hours)	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*
temp $f(t)$ C°	*2.3*	*4.9*	*4.2*	*1.5*	*1*	*3.2*	*4.1*	*1*

Describe briefly what happens to the temperature in the room over the time interval. Speculate on what kind of a room we have here. Plot the data on the graph paper given below and draw a plausible temperature function for the room based on the data. In what time period is the temperature changing most rapidly? Increasing most rapidly?

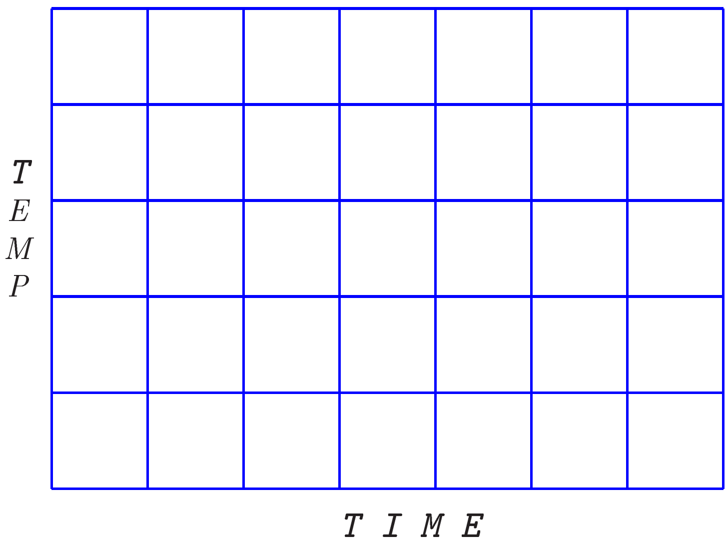


An alternative is to use the graphpaper package to produce graphpaper.



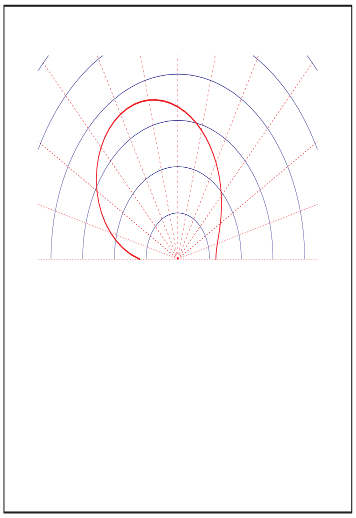
Or, if we wanted the table to be to the left of the graph we could use a 'parbox' command

time t (hours)	temp $f(t)$ (C°
0	2.3
1	4.9
2	4.2
3	1.5
4	1
5	3.2
6	4.1
7	1



On the other hand, one is often faced with the problem of reading data off of a graph of some sort. For example, we might be given a polar coordinate plot of a curve and ask some numerical questions about the plot.

Problem 2 *For the polar plot $r = f(\theta)$ given below, what is the maximum value of r as θ ranges from 0 to π? The minimum value? The average value? Explain your reasoning.*



`The eps files generated by Maple can be improved by editing the postscript file. For example, you can comment out the postscript commands which draw the box around the file. We can also make the lines thicker by bumping up the values of thin, med, and thick in the file.`