

8 Modelling Sunrise

Type III

Work done on this assignment will be assessed against criteria A, B, C, D and F. You are therefore expected to use a graphic display calculator/computer for this assignment.

Answer the following questions.

- 1 How does the time of year affect the time of sunrise?
- 2 If you were to draw a graph of sunrise times against time of year, what kind of a graph might you get?
- 3 How might the location of the place at which you record the sunrise time affect the sunrise time?
- 4 Consider the relative sunrise times of two places with (i) the same latitude, (ii) the same longitude.
- 5 Is dawn earlier or later in the North? Is this always true?
- 6 Go to the following website and use it to obtain the sunrise times in Geneva for the year 1998:

http://aa.usno.navy.mil/AA/data/docs/RS_OneYear.html

- 7 Record sunrise times every two weeks. Record the week numbers and the times in two data lists, L_1 and L_2 . (Don't forget to change the times into decimals of an hour. You could write a short program to do this or use the one below. You may need to change the 25).

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PROGRAM: HOURS
: For(C, 1, 25)
: Prompt H, M
: H+M/60 → L2(C)
: Disp L2(C)
: End
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- 8 Find a regression function for the curve that appears.
- 9 Predict the sunrise time for the 26th week of the year in Geneva.
- 10 Convert the time to hours and minutes using the “fpart” facility on your calculator.
- 11 Repeat parts 6–10 for four more cities, which are 15, 30, 45 and 60 degrees east of Geneva.
- 12 For each city find the regression curve. Predict the regression equation for Mandalay and find its sunrise time in the 33rd week.