Biorhythms[1]

Biorhythms were very popular in the 1960s. You can still find many web sites today that offer to prepare personalized biorhythms, or that sell software to compute them. Biorhythms are based on the notion that three sinusoidal cycles influence our lives. The physical cycle has a period of 23 days, the emotional cycle has a period of 28 days, and the intellectual cycle has a period of 33 days. For any individual, the cycles are initialized at birth, so sine functions that start on that day are used for our model. We will also assume that the amplitude for each is 100 units.

Maple Commands

Before we get started, here are some new Maple commands that we might find useful. Be sure to type `with(Finance):` before using the operations with calendar dates.

- `DayCount(Date1,Date2);` Counts the number of days that has elapsed between the two given dates.

  Example: If today is January 30th, then to count the number of days since Elvis Presley was born, type in the following, where we show two different ways of entering the date:

  ```
  DayCount("January 8, 1935","Jan-30-2013");
  ```

- `AdvanceDate(date, number of days);` You can probably guess what this does.

  Example: What day will it be 32 days from today (assume today is Jan 30):

  ```
  AdvanceDate("Jan-30-2013",32);
  ```

- One last commands that is useful in a lot of situations: The command that produces a sequence: `seq`. Some examples of what it is and how it works- This command is very helpful when you want to construct data.

  ```
  #Print the square of the integers from 1 to 5:
  seq(i^2,i=1..5);
  #List integers from 0 to 100 in multiples of 10:
  seq(0..100,10);
  ```

---

[1]Modified from Cleve Moler's "Introduction to Matlab"

Lab 1:

This is intended to be a somewhat shorter lab than usual. The goals are for you to work on something interesting in Maple, and familiarize yourself with Maple's help sections.

Answer the following in your Maple worksheet. Once you are finished, export the file to PDF and upload both (the Maple file and the PDF file) to a folder labeled "Lab 1" in your CLEo dropbox.

1. Some preliminary questions:

    (a) Assume that t is measured in days since some fixed date in the past (for example, your birthday). Write the three sine functions that would represent the "Physical", "Emotional", and "Intellectual" cycles for you since you were born.

    Hint: The sine curve $A\sin(wt)$ has amplitude A and period $2\pi/w$.

    (b) How many days have you been alive? (Use Maple to compute it)

    (c) Compute the date it will be when you will have been alive for 20,000 days.

2. Write Maple code that will plot your biorhythms for an eight week period centered around today's date (See the help file for `TodaysDate`).

    For the $x-$axis, label it as "Date", and put some dates on the axis.

    For the $y-$axis, label it as "Energy" with the text stacked vertically. Be sure and include a legend.

    Here is an example snippet to get you started. The line breaks are for readability only.

    ```
    with(Finance):

    #This is a comment:  The next line produces a sequence of values.

    H:=[seq(3*i=AdvanceDate("Jan-30-2013",3*i),i=-3..3)];

    plot([100*cos(x/5),100*sin(x/3)],x=-10..10,y=-100..100,
        tickmarks=[ H, default],legend=["Plot 1","Plot2"],
        labels=["x-axis","y-axis"]);
    ```

3. All three cycles start at zero when you are born. How long does it take to return to that initial condition? How old were you, or will you be, on that date?

4. Is it possible for all three cycles to reach their maximum or minimum at exactly the same time?