Maple Project 2 MTH 141 Fall 2003

The purpose of this homework is to get you to know better the capabilities of Maple.

A biology research tem has determined that the height H in feet of certain plant as a function of time t weeks from the moment of germination is well approximated by the following model:

$$H = 2.4713 \left(1 + e^{-t+1}\right) \left(1 - 1.23934 e^{-0.2145(t+1)}\right)^3$$

Use Maple to answer these questions.

a. Produce plots of $H(t)$ and of $H'(t)$ for $0 \leq t \leq 20$. Describe in practical terms what you see in the plot of $H(t)$.

b. When will the plant be 1.5 feet tall? Obtain an approximate graphical answer from a graph, and then solve an equation to obtain a more accurate answer.

c. How fast is the plant growing when it is 1.5 feet tall? Obtain an approximate graphical answer from a graph, and then calculate a more accurate answer.

d. Find all times t when the plant is growing at 0.1 feet per week. Obtain an approximate graphical answer from a graph, and then solve an equation to obtain a more accurate answer.

d. When is the plant growing at the fastest rate? Obtain an approximate graphical answer from a graph, and then solve an equation to obtain a more accurate answer.

COMMENTS and additional information Maple homework should have only one author. You may discuss the project with your classmates, but what you turn in should contain your own answers. Plagiarism is a serious offence. Whenever possible, insert a text comment to explain what you are about to do. Neatness and good English will be taken into account. Maple should be used in all calculations and plots. MAPLE HELP will be available inTyler 101. The schedule and location is announced in `www.math.uri.edu/Courses/fall02/mth142`

USEFUL MAPLE COMMANDS

```
> restart;                      # good to have this at the top of worksheet;
> evalf(%)                    # give a decimal approximation to the previous output
> g:=x->x^2;                   # define the function f(x)=x^2
> D(g)(t);                      # Derivative of g(t)
> D(g)(3);                      # Derivative of g(t) evaluated at t=3
> D(D(g))(t);                   # Second derivative of g(t)
> plot(f(x),x=-1..1,y=0..2);   # plot y=f(x) for -1 < x <1 and 0< y < 2
> plot([f(x),g(x)],x=0..2);    # plot two functions for x between 0 and 2.
> solve(f(x)=g(x),x);          # solve the equation f(x) = g(x) for x.
> fsolve(f(x)=0,x,-2..2);      # find an approximate solution to the equation
                               # f(x) = 0 for x in the interval -2 < x < 2.
> exp(2.5);                    # exponential function evaluated at 2.5
> log(2.5);                    # the natural logarithm of 2.5
```