MATH 237 **Fall 2010**

Maple Assignment 1

Preliminary Reading: Chapters 1 and 2 of the Maple manual.

Problem 1

Using the commands in the first chapter of the manual, generate the plots of the family of functions:

$$\{f = e^{nx}, n = 1, 2, 3, 4, 5\}$$

for the values $x = 1, 2, 3, 4, 5$.

Problem 2

Via maple, plot

$$y(t) = t^2 - 4t - 4,$$

for 30 equidistant points in the interval $[0, 30]$.

Problem 3

Define a procedure which takes two numbers, a, b and a parameter α, and generates:

$$\frac{\alpha}{\frac{1}{a} + \frac{1}{b}}.$$

Using your procedure, compute the output for $\alpha = 2, a = 5, b = 5$.

Problem 4

Evaluate the first derivative of $f(x) = sin(x)$ at π by entering

$$\mathrm{evalf(D(f)(Pi));}$$

Here $D(.)$ is the derivative generator command. Consult the Maple manual to write the expression to define the function $f(x)$.

Problem 5

Enter the command

$$\mathrm{with(DEtools);}$$

Define

$$DE1 := \mathrm{diff(y(t), t) = -y(t);}$$

Solve the equation for y by entering

$$\mathrm{dsolve(DE1, y(t));}$$

With the initial condition $y(0) = 1$, determine a single solution of the differential equation. :

$$\mathrm{dsolve(\{DE1, y(0) = 1\}, y(t));}$$

To see a direction field plot, type

$$\mathrm{dfieldplot(DE1, y, t = -5..5, y = -2.5..1.5);}$$

Problem 6

Type the following in Maple:

$$\mathrm{with(DEtools)}$$

$$\mathrm{DE := diff(y(x), x) = -(2 * x) + 5;}$$

$$\mathrm{DEsoln := dsolve(DE, y(x));}$$

Use the right hand side of DEsoln to generate a list of expressions by using the values 0,1,2 for the constant

$$\_C1$$

and plot the list.

Problem 7

Using the diff and the dfieldplot commands, plot the direction field of the solutions to the equation

$$\frac{dy}{dx} = -e^{x/2} + x/2$$

in the interval, $x = -5..5$, and $y = -4..4$

Problem 8

Using the diff and the dfieldplot commands, plot the direction field of the solutions to the equation describing the falling object subject to drag:

$$\frac{dv}{dt} = 9.8 - \frac{1}{4}v$$

in the interval, $t = 0..5$, and $v = -4..4$. Explain what happens as $t \to \infty$.