

Math 2250
Maple Project 1 Part A
August 2003

Due date: See the internet due dates. Maple lab 1 has parts A (problems 1.1, 1.2) and B (problems 1.3, 1.4, 1.5, 1.6), issued in two different documents. This document is part A.

References: Code in maple appears in 2250mapleL1a-F2003.txt at URL

<http://www.math.utah.edu/~gustafso/>.

This document: 2250mapleL1a-F2003.pdf.

Problem 1.1. (Quadratic equation)

Factor and solve the quadratic equation $ax^2 + bx + c = 0$ for the following cases:

(A) $a = 1, b = 2, c = 1$;

(B) $a = 1, b = 1, c = 1$;

(C) $a = 1, b = -3, c = 2$.

In your solution, show the solution steps by hand and also the maple code which verifies the answer.

Problem 1.2. (Functions and plotting)

Define the following functions and plot domains, then plot them.

(A) $\sin(3x), 0 \leq x \leq 3\pi$.

(B) $|x + 2|, -4 \leq x \leq 1$.

(C) $\int_0^x |\sin(e^x)| dx, 0 \leq x \leq 3$.

(D) $a + b \sin(c(t - t_0)), 0 \leq t \leq 24, a = 15, b = 1.1, c = \pi/12, t_0 = 12$.

Example 1. Factor and solve $x^2 + 5x + 6 = 0$ by hand and by using maple.

Solution: The factorization $(x + 3)(x + 2) = 0$ gives the answers $x = -3, x = -2$. The maple code which applies is

```
eq:=x^2+5*x+6:
factor(eq);
solve(eq=0,x);
```

To get maple help on the relevant commands, enter `?factor` or `?solve` into a maple worksheet.

Example 2. Define a function $y = x^2 + 5x + 6$ on $-4 \leq x \leq -1$ using maple and plot it.

Solution: The maple code which applies is

```
f:=x->x^2+5*x+6:
a:=-4: b:=-1:
plot(f(x),x=a..b);
```

The inline function `f:=x->x^2+5*x+6` uses a minus sign (-) and a greater than sign (>) to separate the variable name (x) from the function definition ($x^2 + 5x + 6$). This construct is equivalent to using `f:=unapply(x^2+5*x+6,x)`. To get help on inline functions, enter `?unapply` into a maple worksheet. To get maple plot help, enter `?plot` into a maple worksheet.

Example 3. Run the maple tutorial in maple versions 6,7,8,9.

Solution: In a maple worksheet, enter `?newuser` and choose the *New User's Tour*. In the tour, you will learn some basics of maple.

Hint on 1.2: Investigate the help panels for `sin`, `abs`, `exp` and `Int` (the inert version of `int`). Beware of direct use of `int` in plot commands, as unexpected results can occur without any error message (try it on (C) above for an illustration). The constant π is coded in maple as `Pi`, the upper and lowercase letters being significant. A common error is to code `c=Pi;` instead of the correct `c:=Pi;`. The error message *empty plot* can mean that a variable name is undefined. For example, `plot(x+PI,x=0..1);` will not plot. To see why, use `p:=plot(x+PI,x=0..1);` to display the plot data. The offending variable name is PI (different than Pi or pi).

End of Maple Lab 1 Part A.