

## MATH 353 MAPLETIPS

This assignment can be done in MS 571, 515, 521. Printouts will go to ST 142 (Elbow Room in Science Theatres). In MS 571, 515, 521 first hold down Control-Alt-Del, click mouse on Username and type that in, click (do not use Enter button here) on Password and type that in, click Login, then click OK, then double click Maple 10. Each mathematical command starts with a cursor `|`, and finish each command with a return (the Enter key, or use a `:` followed by Enter if you wish to suppress the printing). Detailed instructions for completing the assignment are given below. These instructions assume that you have already done the MAPLE Warmup (for example you should know how the right arrow is used in typing mathematical expressions). Don't forget to logout when done. The rooms mentioned are available at times which are posted on the doors of each room. MS 571 is even available on weekends. If a class is using the room (and a terminal is free) first ask the instructor for permission.

### INSTRUCTIONS

Your assignment should be turned in from the computer print-out, must be stapled, and should be about 3-5 pages long. Unstapled assignments not accepted. Do the questions in order and number each question clearly. Your name (or any other text) can be typed in by clicking the Maple Menu at top on "T", typing in whatever is needed, and then "Enter". To go back to the Maths Mode click the Menu on "`[>`".

The specific commands for each problem follow. A couple of useful hints are first given. The basic arithmetical operations in Maple are `+` `-` `*` `/` `^` `.`. Be very careful about parentheses, there must always be as many left parentheses as right parentheses. Also be careful to write capital letters as capitals and do not miss any commas. The multiplication command `*` must often be explicitly written in (recommendation - always write it in, it's safer to do so - so  $3x(y+z)$  is typed in as `3*x*(y+z)` ). The command `%` is a short-hand for the previous line's output. The exponential function  $e^x$  is typed `exp(x)`, other common functions are `ln`, `sin`, `sinh`, `arcsin`, `arcsinh`, etc. For some of the questions it's convenient to first define a function or symbol, then be careful to undefine it when the question is finished or MAPLE will keep the first meaning in all succeeding problems. When typing in certain mathematical expressions, such as an exponent, MAPLE will switch to a higher (or lower) line. To return to your original line of typing just hit the `→` key.

Enter your name and lecture number (L01 or L02) on first page, and your ID number on p.2. Papers missing this information (or not stapled) will not be accepted. For the first few questions we give all details. In the further questions you will be a little more on your own.

1. (a) `evalf(Pi)`  
(b) `evalf(Pi,100)`  
(c) Careful here or you will get the wrong answer. **Think!** A written explanation of your answer must also be given here for credit.
2. For this question and many others, it is useful to first define the function  $f$ , then any error you might have made will be seen at once. Once the question is done, be sure to undefine  $f$ . Here are the steps.  
 $f := (7 * (\sin(x)) \wedge 4 + 5 * (\cos(x)) \wedge 6) \wedge 2$

```
int(f, x=0..(Pi/2))
unassign('f')
```

3. Again, first define the function  $f$  that is to be graphed. Now enter

```
(a) plot(f, x=-3..3)
(b) done by looking at the graph in (a)
(c) fsolve(f=0, x) This will give the zeros of  $f$  to 10 digit accuracy, which is the
default accuracy of MAPLE. unassign('f')
```

Before doing the further problems, we will input three “packages” that are needed for special tasks. The commands for these will be followed by a `:` so they will not appear on your printout.

```
with(linalg):
with(VectorCalculus):
with(plots):
```

4.  $C := \text{matrix}(3, 3, [2, 3, 4, 3, 5, 0, 4, 0, -2])$

```
(a) det(C)
(b) eigenvalues(C)
(c),(d) You are on your own here. unassign('C')
```

5. First define the function  $f$

```
(a) 3dplot(f, x = -1..1, y = -2..2)
(b) contourplot(f, x = -2..2, y = -2..2) (c) The answer should be either relative
max, relative min, or saddle point. unassign('f')
```

6. Just like the double integral in the MAPLE Warmup, with the addition of the limits which will read (after the integral)  $, z = 0..(3y - x), y = 0..x, x = 1..2$

7. Exactly as in the Warmup. You should find 5 critical points (ignore ones saying “RootOf( )”).

```
8. SetCoordinates(cartesian[x, y, z])
LineInt(VectorField(< y, x, z^2 >), Path(< t^2 + t, 2t, t^4 + t^3 >, t = 1..3))
```

```
9. SurfaceInt(x^2 + y + z, [x, y, z] = Surface(< s, t, s + t >, s = 0..1, t = 0..1))
```

```
10. SetCoordinates(cartesian[x, y, z])
F:=VectorField(<the given vector field>)
G:=Curl(F)
Divergence(G)
```

To print just go to File and click on Print, similarly to exit go to File and click on Exit. It will ask you if you wish to save your work, generally the answer is No, but if you wish to continue the session later just use the Save As command as usual to create a file. Don't forget to logout when session is finished.

Caution: If you save your work and return later, be sure to re-enter the three packages again as MAPLE will have forgotten them. The easiest way to do this is to go back to the start of your file and press Enter over and over until back to where you left off.