Handy Maple Info

Below of some of the major Maple commands we use in class. You are responsible for knowing how to use these (i.e., translating from what appears below into what will work in Maple). You may bring this sheet to exams.

1. `with(VectorCalculus)`: needed for working with vectors
2. `with(plots)`: needed for most graphing
3. `plot(f(x),x=a..b);` for 2D graphing
4. `plot([x(t),y(t),t=a..b]);` for 2D parametric curves
5. `plot3d(f(x,y),x=a..b,y=c..d);` for 3D graphing
6. `plot3d([x(t),y(t),z(t)],t=a..b,s=c..d);` for 3D parametric curves
7. `arrow(<start position>,<end position>);` for graphing a vector. The start position can be omitted if it is the origin.
8. `implicitplot3d(equation,x=a..b,y=c..d,z=e..f);` for 3D graphs of implicitly defined functions (e.g., graphs of solution sets of equations)
9. `display({graph 1, graph 2, ..., graph n});` for combining multiple graphs of different types on the same set of axes. Each “graph” is a complete graphing command.
   
   **NOTE:** All graphing commands can plot multiple graphs of that type. Just list them in curly braces, like this: `plot3d({f(x),g(x)},x=a..b);`. Also, there are various options for each plot (such as `axes=boxed`, etc.). Many of those are available by right-clicking on the graph.
10. Defining a variable is done with `:=` as follows: `u:=<3,1,5>;` defines `u` as the vector `<3,1,5>`. After that, you can use `u` anywhere you would have otherwise used `<3,1,5>`.
11. The dot product is computed with a period: `u.v;` gives `u·v`.
12. The cross product is computed with `&x`: `u&x v;` gives `u × v`.
13. The number π is Pi in Maple. **NOTE:** Maple is in radian mode.
14. Use `exp(x)` for $e^x$. Maple does not know $e$ as a number; it’s just another variable.
15. `diff(f(x),x);` computes the derivative of $f$ with respect to $x$. This also works for vector-valued functions by replacing $f(x)$ with $r(t)$ (and $x$ with $t$ in the second argument) and for partial derivatives.
16. `int(f(x),x);` computes the integral of $f$ with respect to $x$. This also works for vector-valued functions by replacing $f(x)$ with $r(t)$ (and $x$ with $t$ in the second argument) and for multiple integrals.
17. There are two ways to evaluate functions in Maple.
   
   (a) If the function is defined by `f:=x*y+3` (for example), then you can evaluate $f(2,3)$ with `subs({x=2,y=3},f);`
   
   (b) If the function is defined by `f:=(x,y)->x*y+3`, then you can evaluate $f(2,3)$ by entering $f(2,3)$.
   
   The `->` symbol is a minus sign followed by a greater than sign.
18. The gradient of a function requires the VectorCalculus package. The command is `Gradient(f(x,y),[x,y]);`, where $f(x,y)$ should be replaced with your function.
19. To plot in other coordinate systems, use the option `coords=[whatever]` in your plot command. For example, to plot in polar coordinates, use `coords=polar`.
20. To plot a vector field, use `fieldplot` or `fieldplot3d`. Both require that the VectorCalculus and plots packages are loaded. The syntax is similar to plot and plot3d; e.g., `fieldplot(<4x,5y>, x=-5..5,y=-5..5);`
21. To use Maple’s vector field functionality, you must first set the coordinate system: \texttt{SetCoordinates(’cartesian’[x,y,z])};

22. To define a vector field, use \texttt{VectorField(<P,Q,R>)}; with P, Q, and R equal to the corresponding components of your vector field.

23. \texttt{curl}\vec{F} \text{ is } \texttt{Curl(F)}; \text{ or } \texttt{del &x F}; – note that F must be defined as a vector field for this to work.

24. \texttt{div}\vec{F} \text{ is } \texttt{Divergence(F)}; \text{ or } \texttt{del.F}; – note that F must be defined as a vector field for this to work.

\textbf{NOTE:} I will not be available during exams to help you sort out Maple issues. It just isn’t feasible logistically, so I will rely on you to be able use Maple yourself if you want to. I will not be testing Maple itself on exams, so you will be able to do everything by hand. However, Maple will be available to you so that you don’t have to do everything by hand. Be sure to follow all instructions about showing your work.