

Some *Mathematica* functions

1. Basic Algebra

- `N[x]` transforms a fraction or any “nasty” math expression into a decimal number
- `Abs[x]` is the absolute value
- `Expand[x]` expands a math expression
- `Together[x]` takes out common factors
- `Simplify[x/y]` use for simplifying a fraction
- `E^x = e^x` note the capital “E”
- `Log[x] = ln(x)` note the capital “L”
- `Sum[n, {n, 0, 10}] = 0+1+2+3+4+5+6+7+8+9+10`

2. Trigonometric Functions

- `Sin[x]` note the capital “S”
- `Cos[x]` note the capital “C”
- `ArcSin[x]`
- `ArcCos[x]`
- `TrigReduce[x]` often puts trig expressions in a nicer form

3. Derivation and Integration

- `f'` returns the derivative of *f* (*Mathematica* can compute derivatives!)
- `Integrate[f[x], {x, xmin, xmax}]` integrates *f* from *xmin* to *xmax*
- `NIntegrate[f[x], {xmin, xmax}]` use when you want the result to be a number rather than a formula containing functions

4. Solving equations

- `Solve[f[x]=g[x],x]` note the two equal signs; this is not a typo!
- `NSolve[f[x]=g[x],x]` note the two equal signs; this is not a typo!
- `FindRoot[f[x]=g[x], {x,x_approximation}]` use when others fail

5. Plotting and visualizations

- `Plot[f[x], {x, xmin, xmax}, PlotStyle->{{Blue, Thickness[0.01]}]}`
- `Plot[{f[x], g[x], h[x]}, {x, xmin, xmax}]` plots *f, g, h* on the same plot
- `Plot3D[f[x, y], {x, xmin, xmax}, {y, ymin, ymax}]` 3D plot
- `ParametricPlot[{x[t], y[t]}, {t, tlow, thigh}]` for parametric curves
- `ParametricPlot3D[{x[t], y[t], z[t]}, {t, tlow, thigh}]` for parametric surfaces

6. Differential Equations

- `DSolve[{y'[x]=x^3, y[0]=9}, y[x], x]`
- `NDSolve[{y'[x]=x^3, y[0]=9}, y[x], {x, xmin, xmax}]`

7. Series expansion

- `Normal[Series[f[x], {x, center, number_of_terms}]]`

8. Other useful functions

- `Clear[x, y, f, a, b]`
- `Table[n!, {n, 0, 10}]`
- `Animate[....]` and `ListAnimate[...]` will be described in tutorials