Some basic *Mathematica* commands

Mathematica is a general purpose mathematical program. Below is a sample of inputs. One at a time, type each input and have *Mathematica* execture it. To execute an input, get the cursor in the same line as the input and press SHIFT-RETURN or the ENTER key. You can edit any input line and execute it again. You can also cut and paste.

For each command, you should think about the syntax. What does each piece of the input mean? Try changing a part of the input and predicting what will result before you have *Mathematica* process the input.

```
3 / 12

3 / 12.

Pi

N[Pi, 100]

Factor[x^2 + 5 x + 6]

Solve[x^2 + 3 x - 6 == 0, x]

D[Sin[x], x]

D[Sin[x], {x, 2}]

Integrate[Sin[x], x]

Integrate[Sin[x], {x, 0, Pi}]

f[x_] = x^2

f[3]

f'[x]

Integrate[f[x], x]

Table[1 / k^2, {k, 1, 4}]

Sum[1 / k^2, {k, 1, 4}]

Sum[1 / k^2, {k, 1, Infinity}]

Plot[Sin[x], {x, 0, 2 Pi}]

Plot3D[Sin[x^2 + y^2], {x, -2, 2}, {y, -2, 2}]

ParametricPlot[{Cos[t], Sin[t]}, {t, 0, 2 Pi}]

ParametricPlot[{Cos[t], Sin[t]}, {t, 0, 2 Pi}, AspectRatio → Automatic]

mycircle = ParametricPlot[{Cos[t], Sin[t]}, {t, 0, 2 Pi}, AspectRatio → Automatic]

myellipse = ParametricPlot[{2 Cos[t], 5 Sin[t]}, {t, 0, 2 Pi}, AspectRatio → Automatic]

Show[mycircle, myellipse]
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```
ParametricPlot3D[{5 Cos[t], 5 Sin[t], t}, {t, 0, 6 Pi}]

myhelix = ParametricPlot3D[{5 Cos[t], 5 Sin[t], t}, {t, -3 Pi, 3 Pi}]

mysphere = ParametricPlot3D[{Sin[u] Cos[v], Sin[u] Sin[v], Cos[u]}, {u, 0, Pi}, {v, 0, 2 Pi}]

mytorus = ParametricPlot3D[
  {(3 + Cos[u]) Cos[v], (3 + Cos[u]) Sin[v], Sin[u]}, {u, 0, 2 Pi}, {v, 0, 2 Pi}]

Show[myhelix, mysphere, mytorus, PlotRange → All]

Table[
 Plot[Sin[2 Pi t] Sin[x], {x, -Pi, Pi}, PlotRange → {-1, 1}, PlotStyle → RGBColor[1, 0, 0]],
 {t, 0, 1 - 0.025, 0.025}]

Table[
 Plot3D[Sin[2 Pi t] Sin[x^2 + y^2], {x, -2, 2}, {y, -2, 2}, PlotRange → {-1, 1}],
 {t, 0, 1 - 0.05, 0.05}]
```