Mathematica Cheat Sheet — Youhao HU

Mathematica Command line

- `Clear["`*"]`: Clear all the variables.
- `Clear[w0]`: Clear the variable w0.
- `w0=.`: Clear the variable w0.
- `%`: The last calculation result.
- ⎋+a+⎋: Insert α.
- `\[Alpha]`: Insert α.

Matrix and array

$$A=\begin{bmatrix}1&2&3\\4&5&6\\7&8&9\end{bmatrix},\quad B=\begin{bmatrix}1&2&3\\4&5&6\\7&8&9\end{bmatrix} \qquad (1)$$
$$C=AB$$

Rendered as the below code in Mathematica:

```
A = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
B = {{1, 2, 3}, {4, 5, 6}, {7, 8, 9}};
C = A.B;
```

Plot

Plot the function $V=\frac{4}{\pi}\frac{V_{in}}{Z_{in2}}$, $Z_{in2}=\omega M+\frac{R_1(R_2+R_e)}{\omega M}$ from $Re=0\Omega$ to $Re=10\Omega$ (Assume that all the other variables are defined except R_e):

```
Zin2 = w M + (R1 * (R2 + Req)) / w / M;
V2   = 4 / Pi Vin / Zin2;
Plot[V2, {Req,0,10}]
```

Plot first-order differential equation

$$\dot{x}+3x=0,\quad x(0)=1 \qquad (2)$$

Plot the solution $x(t)$ from $t=0$ to $t=10$.

```
Clear[x]
xout = NDSolveValue[{x'[t]+3*x[t]==0,x[0]==1},
    x, {t,0,10}]
Plot[xout[t],{t,0,10},PlotRange->All]
```

Plot second-order differential equation

$$\ddot{y}+\sin(y)=0,\quad y(0)=2,\quad \dot{y}(0)=1 \qquad (3)$$

Plot the solution $y(t)$ from $t=-10$ to $t=10$:

```
Clear[y]
ode1 = {y''[t] + Sin[y[t]] ==
    0,y[0]==2,y'[0]==1};
sol = NDSolve[ode1,y,{t,-10,10}]
Plot[y[t] /. sol, {t,-10,10}] (* For only y *)
Plot[Evaluate[{y[t],y'[t],y''[t]} /. sol],
    {t,-10,10}] (* For y, ydot and yddot*)
```

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