23.02.2022

Plan (this semester/labs)

* learn how to use Maple for symbolic computation
* learn how to create beautiful plots w/ Maple
* analyze/simulate/understand Dynamic System using a Computer

Computer Algebra systems

* capable of symbolic computation (= integral x^(5/7) dx -> result)
* solve A = (-1 1 3/ 2 1 4/ 0 0 -1)

Ax =(-1/0/1), x=?

A^-1

* this is numerical computation

Ex: Maple, Mathematica/Wolfram Alpha, MathCAD, SAGE(free, but Viorel is against)

STATISTICS (best thing to learn)

(design and automatic control, on top of ds)

DS (second best thing to learn) -> any iterative algorithm (every for loop) is a discrete time DS

* DS = STATES & Law of Change

(implicitly : TIME)

Classical Mechanics

Quantrum –“”-

Electrodyn etc.

TRAINING OF a neutral network (NN) (ML)

What is an equation?

-relation between known (constants, coef., param.) & unknown quantities

-the aim is to solve the eq. (= express the unknown in terms of coeffs.)

-ax-b=0, the sol is x=b/a=b\*a^(-1)

-solving requires inverting the operations in the eq (/ => \*)

What is a differential equation?

-diff op.

-diff op subclass of functional eq (sols=funtion)

-x(t), x’(t) = f(t) with a given f; for ex: x’(t)=cos(t) x(t)=?, x(t) = antiderivative of f(t) dt +c

-x’(t)=x(t), x(t)=? =c\*e^t => not one sol but a family of sols

What is a solution of an ordinary diff. eq. (ODE)?

software and symbolic compt of sols to odes.

x’(t)=x(t)-x(t)^2 <- has explicit sol

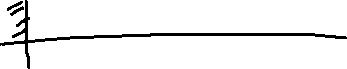
9.03.2022

ex 9

x’’+a(t)x=0

a=1,a=t,a=t^5

(No friction)



a>0 a=elastic coef of the srping, tells you how strong is the sping

pi

a=1 x’’+ax=0

charact eq 1r^2+0r+a=0

For const coef



r^2+ar=0

r=+- i radical a, for r=+-i(a=1)

x’’(t)+tx(t)=0 use maple

r^2+t=0 MISTAKE

a=const>0

Spring-mass

