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(*Solve the Radioactive decay eq by Dsolve
  command with initial contiditions N(0)=1000 at t=0 *)

eq = n'[t] + n[t] / T == 0;
Sol = DSolve[eq, n[t], t]

nt = n[t] /. Sol[[1]]

nt = nt /. T → 1 / E

eq1 = (nt /. t → 0) == 1000

eq2 = nt /. C[1] → 1000

Plot[eq2, {t, 0, 10}]

(*solve the eq of pendulm with initial conditions th=1 at t=0*)

eqp = th''[t] + g / l * th[t] == 0;
solp = DSolve[eqp, th[t], t]

solp = th[t] /. solp[[1]]

solp = solp /. {g → 9.8, l → 100}

eq1 = (solp /. t → 0) == 0
eq2 = (solp /. t → 1) == 1

constant = Solve[{eq1, eq2}, {C[1], C[2]}]

solp = solp /. constant[[1]]


Plot[solp, {t, 0, 180}]

(*alternative method*)

eq1 = th'[t] - w[t] == 0;
eq2 = w'[t] + g / l * th[t] == 0;
sol = DSolve[{eq1, eq2}, {th[t], w[t]}, t]

sol1 = th[t] /. sol[[1]]

sol2 = w[t] /. sol[[1]]

theta = sol1 /. {g → 9.8, l → 100}
omega = sol2 /. {g → 9.8, l → 100}

eqq1 = (sol1 /. t → 0) == 5
eqq2 = (sol2 /. t → 0) == 0

constant = Solve[{eqq1, eqq2}, {C[1], C[2]}]

theta = theta /. constant[[1]]
omega = omega /. constant[[1]]

Plot[{theta, omega}, {t, 0, 360}]
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