

Step 1: Open chapter 12 and click on [LEP-T12-2.pol](#) under Polymath™ Code

The screenshot shows the website interface for 'Elements of Chemical Reaction Engineering, 5th Edition'. The main content area is titled 'Chapter 12: Steady-State Nonisothermal Reactor Design: Flow Reactors with Heat Exchange'. Underneath, there is a section for 'Living Example Problems' with a table listing various problems and their corresponding code files.

Living Example Problem	Polymath™ Code	Matlab Code	Wolfram CDF Code *	AspenTech™
LEP Table 12-2 computer experiment	LEP-T12-2.pol	LEP-T12-2.zip	LEP-T12-2.cdf (1560KB)	--
Example 12-1 isomerization of Normal Butane with Heat Exchanger	a) Co-current: LEP-12-1a.pol	a) Co-current: LEP-12-1a.zip	a) Co-current: LEP-12-1a.cdf	--
	b) Countercurrent: LEP-12-1b.pol	b) Countercurrent: LEP-12-1b.zip	b) Countercurrent: LEP-12-1b.cdf	
	c) Constant T _a : LEP-12-1c.pol	c) Constant T _a : LEP-12-1c.zip	c) Constant T _a : LEP-12-1c.cdf	
	d) Adiabatic: LEP-12-1d.pol	d) Adiabatic: LEP-12-1d.zip	d) Adiabatic: LEP-12-1d.cdf	
	a) Adiabatic: LEP-12-2a.pol	a) Adiabatic: LEP-12-2a.zip	a) Adiabatic: LEP-12-2a.cdf	

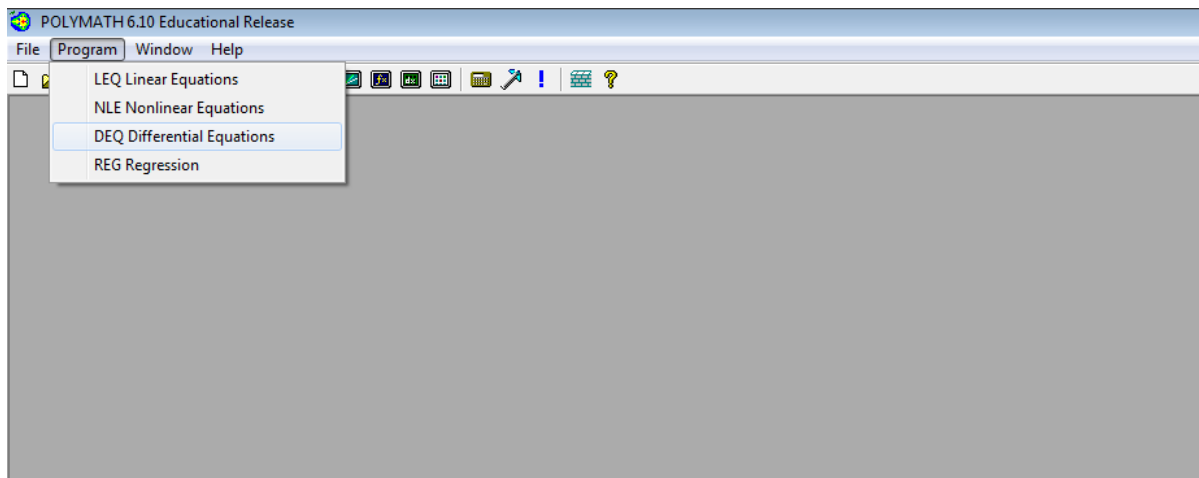
Step 2: After opening the file, you should see following window. Select all the codes, right click and then copy the codes

The screenshot shows a web browser window displaying the content of a Polymath code file. The code is a set of differential equations and initial conditions for a reactor design problem. A context menu is open over the code, with the 'Copy' option selected.

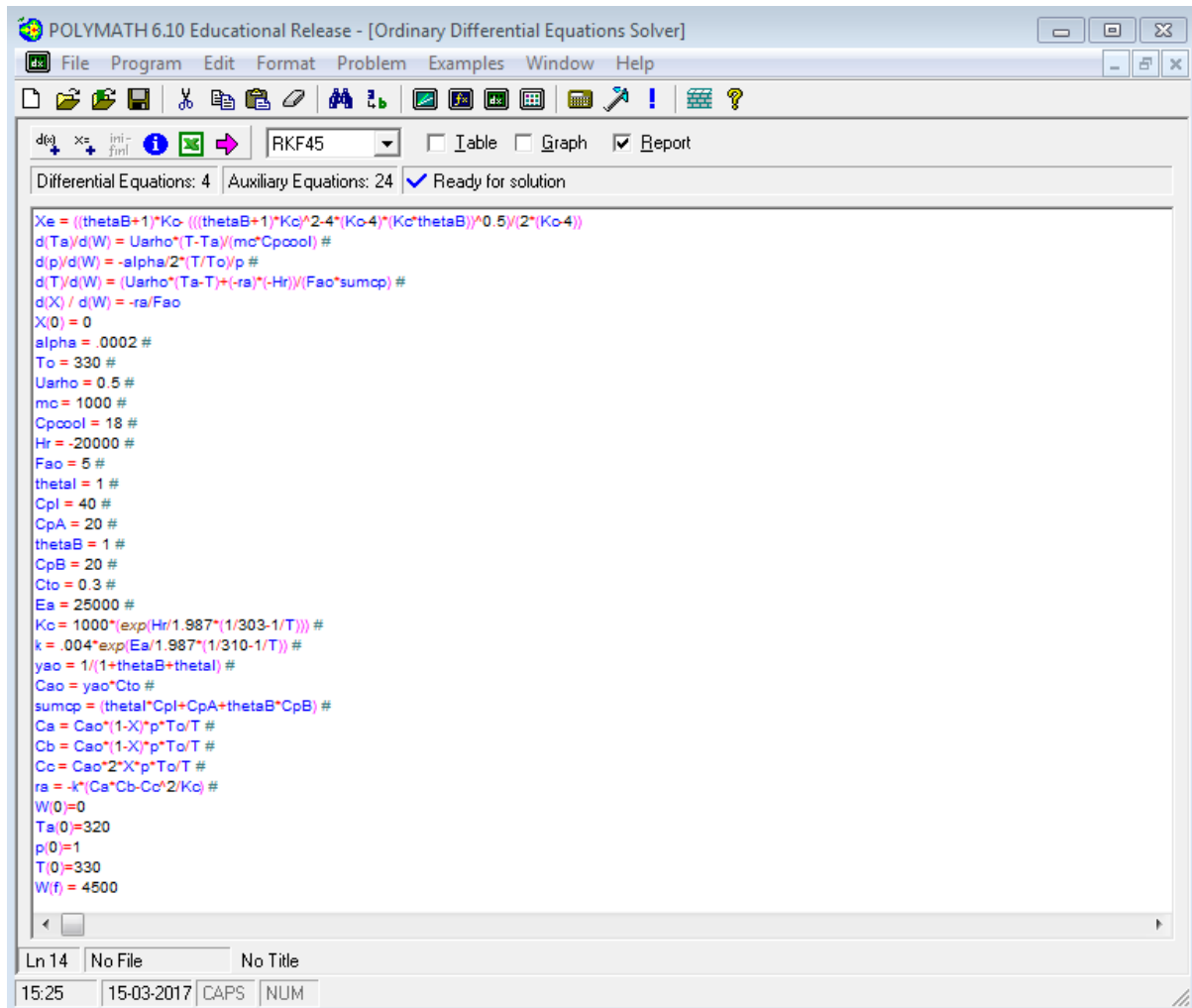
```


Xe = ((thetaB+1)*Kc - (((thetaB+1)*Kc)^2 - 4*(Kc-4)*(Kc*thetaB))^0.5)/(2*(Kc-4))
d(Ta)/d(W) = Uarho*(T-Ta)/(mc*Cpcool) #
d(p)/d(W) = -alpha/2*(T/To)/p #
d(T)/d(W) = (Uarho*(Ta-T) + (-ra)*(-Hr))/(Fao*sumcp) #
d(X) / d(W) = -ra/Fao
X(0) = 0
alpha = .0002 #
To = 330 #
Uarho = 0.5 #
mc = 1000 #
Cpcool = 18 #
Hr = -20000 #
Fao = 5 #
thetaI = 1 #
CpI = 40 #
CpA = 20 #
thetaB = 1 #
CpB = 20 #
Cto = 0.3 #
Ea = 25000 #
Kc = 1000*(exp(Hr/1.987*(1/303-1/T))) #
k = .004*exp(Ea/1.987*(1/310-1/T)) #
yao = 1/(1+thetaB+thetaI) #
Cao = yao*Cto #
sumcp =
Ca = Cao
Cb = Cao
Cc = Cao
ra = -k*
W(0)=0
Ta(0)=320
p(0)=1
T(0)=330
W(f) = 4500
    
```

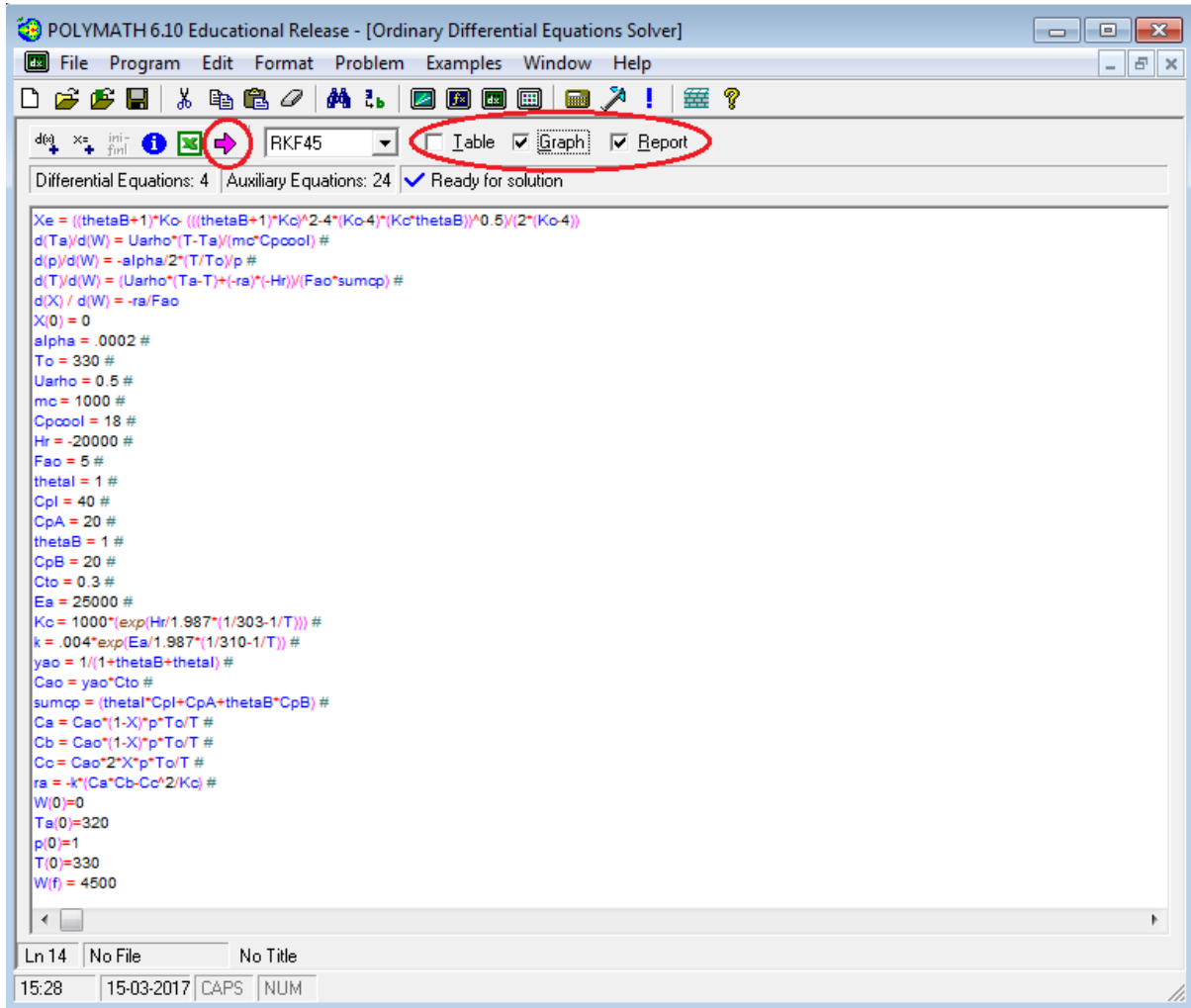
Step 3: Open Polymath and click on “DEQ Differential Equations” under Program tab present on toolbar.



Step 4: You should see that a blank window opens. Right click on the white space and select Paste option to put the codes in the space



Step 5: Check the boxes corresponding to Report and Graph option to generate solution in report and graphical format respectively. Click on the pink arrow  to run the program



POLYMATH 6.10 Educational Release - [Ordinary Differential Equations Solver]

File Program Edit Format Problem Examples Window Help

Table
 Graph
 Report

Differential Equations: 4 Auxiliary Equations: 24 Ready for solution

```

Xe = ((thetaB+1)*Ko (((thetaB+1)*Ko^2-4*(Ko-4)*(Ko*thetaB))^0.5)/(2*(Ko-4))
d(Ta)/d(W) = Uarho*(T-Ta)/(mc*Cpcool) #
d(p)/d(W) = -alpha/2*(T/To)/p #
d(T)/d(W) = (Uarho*(T-T)+(-ra)*(-Hr))/(Fao*sumcp) #
d(X) / d(W) = -ra/Fao
X(0) = 0
alpha = .0002 #
To = 330 #
Uarho = 0.5 #
mc = 1000 #
Cpcool = 18 #
Hr = -20000 #
Fao = 5 #
theta = 1 #
Cpl = 40 #
CpA = 20 #
thetaB = 1 #
CpB = 20 #
Cto = 0.3 #
Ea = 25000 #
Ko = 1000*exp(Hr/(1.987*(1/303-1/T))) #
k = .004*exp(Ea/(1.987*(1/310-1/T))) #
yao = 1/(1+thetaB+theta) #
Cao = yao*Cto #
sumcp = (theta*Cpl+CpA+thetaB*CpB) #
Ca = Cao*(1-X)*p*To/T #
Cb = Cao*(1-X)*p*To/T #
Cc = Cao*2*X*p*To/T #
ra = -k*(Ca*Cb-Cc^2/Kc) #
W(0)=0
Ta(0)=320
p(0)=1
T(0)=330
W(f) = 4500
    
```

Ln 14 No File No Title

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Step 6: You should see that Polymath report is generated in a new window. To obtain graph, close the current window by clicking on X button

POLYMATH Report
Ordinary Differential Equations 15-Mar-2017

Calculated values of DEQ variables

	Variable	Initial value	Minimal value	Maximal value	Final value
1	alpha	0.0002	0.0002	0.0002	0.0002
2	Ca	0.1	0.0111092	0.1	0.0111092
3	Cao	0.1	0.1	0.1	0.1
4	Cb	0.1	0.0111092	0.1	0.0111092
5	Cc	0	0	0.0655948	0.0255273
6	CpA	20.	20.	20.	20.
7	CpB	20.	20.	20.	20.
8	Cpcool	18.	18.	18.	18.
9	CpI	40.	40.	40.	40.
10	Cto	0.3	0.3	0.3	0.3
11	Ea	2.5E+04	2.5E+04	2.5E+04	2.5E+04
12	Fao	5.	5.	5.	5.
13	Hr	-2.0E+04	-2.0E+04	-2.0E+04	-2.0E+04
14	k	0.046809	0.0303238	8.418378	0.0303238
15	Kc	66.01082	1.036802	93.4225	93.4225
16	mc	1000.	1000.	1000.	1000.
17	p	1.	0.2360408	1.	0.2360408
18	ra	-0.0004681	-0.007521	-3.531E-06	-3.531E-06
19	sumcn	00	00	00	00

No File POLYMATH Report

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Step 7: You should obtain following graph. To go back to the coding section (Step 4) click on X button

