

Knowlton

Materials Science and Engineering

Boise State University

Text, Arrows and Legends - How to use them in you plots

Extra Credit: Use the example below to create your own program

- We will plotting the activity of component one and two as a function of the fractional amount of $2.a_1^\alpha$ and $a_1'^\alpha$ as a function of $X_2^{\alpha 2}$.

To add Arrows and Text, we use the following commands:

Epilog[]

Arrow[]

Text[]

```
In[28]:= {Arrow[{{3 Pi / 2, 1 / 2}, {Pi, 0}}], Text["Zero", {3 Pi / 2, 1 / 2}, {-1, -1}]}
```

```
Out[28]= {Arrow[{{3 Pi / 2, 1 / 2}, {Pi, 0}}], Text[Zero, {3 Pi / 2, 1 / 2}, {-1, -1}]}
```

```

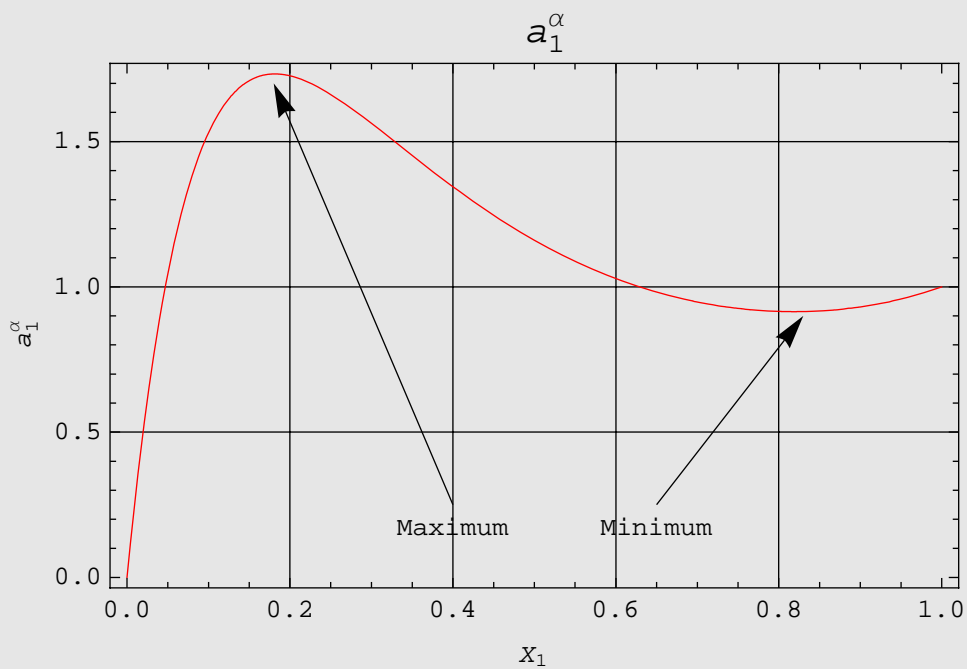
In[29]:= Clear[Ta1, X2, T,  $\gamma$ a, ao,  $\Delta S1aL$ ,  $\Delta G1aL$ ]
 $\Delta G1aL[T_] := (Ta1 - T) \Delta S1aL$ 
 $a1a[X1_, T_] := X1 \text{Exp}\left[\frac{ao (1 - X1)^2}{R T}\right]$ 
 $a1prime[X1_, T_] := a1a[X1, T] \text{Exp}\left[\frac{\Delta G1aL[T]}{R T}\right]$ 

R = 8.314;
ao = 8400;
Ta1 = 1500;
 $\Delta S1aL = -9$ ;

Plot[a1a[X1, 300], {X1, 0, 1}, Frame  $\rightarrow$  True, GridLines  $\rightarrow$  Automatic,
PlotStyle  $\rightarrow$  {RGBColor[1, 0, 0]}, FrameLabel  $\rightarrow$  {"X1", "a1 $\alpha$ "},
PlotLabel  $\rightarrow$  " a1 $\alpha$ ",
Epilog  $\rightarrow$  {Arrow[{{.4, .25}, {.18, 1.7}}], Arrow[{{.65, .25}, {.83, .9}}]},
Text["Maximum", {.4, .12}, {0, -1}],
Text["Minimum", {.65, .12}, {0, -1}]]
Null

```

Out[37]=



In[39]=

Here is another example using Arrows and Text using the commands:

```
Show[]
```

Epilog[]

Arrow[]

Text[]

```

In[40]:= Clear[Ta1, X2, T, γa, ao, ΔS1aL, ΔG1aL]
ΔG1aL[T_] := (Ta1 - T) ΔS1aL

a1a[X2_, T_] := (1 - X2) Exp[ $\frac{ao X2^2}{R T}$ ]

alprime[X2_, T_] := a1a[X2, T] Exp[ $\frac{\Delta G1aL[T]}{R T}$ ]

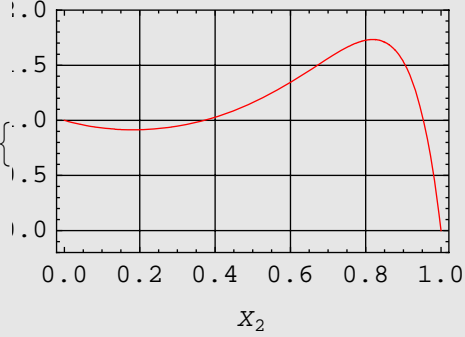
R = 8.314;
ao = 8400;
Ta1 = 1500;
ΔS1aL = -9;

Plot1a = Table[
  (*Print["T= ", T, " K"];*)
  Plot[a1a[X2, T], {X2, 0, 1}, PlotRange → {-0.2, 2}, Frame → True,
    GridLines → Automatic, PlotStyle → {RGBColor[1, 0, 0]},
    FrameLabel → {"X2", "a1α"},
    PlotLabel -> " a1α - Temp. Range: 300 - 1500 K; Increments: 100 K",
    DisplayFunction → Identity], {T, 300, 1500, 100}]
Show[Plot1a,
  Epilog → {Arrow[{{.45, -.125}, {0, .98}}], Hue[.7],
    Arrow[{{.84, 1.76}, {.65, .25}}], Hue[.9],
    Text["About 1", {.4, -0.2}, {0, -1}], Hue[.7],
    Text["Inc. Temp.", {.8, 1.8}, {0, -1}]},
  DisplayFunction -> $DisplayFunction]
Plot1prime = Table[
  (*Print["T= ", T, " K"];*)
  Plot[alprime[X2, T], {X2, 0, 1}, PlotRange → {-0.1, 1.05},
    Frame → True, GridLines → Automatic, PlotStyle → {RGBColor[0, 0, 1]},
    FrameLabel → {"X2", "a1α"},
    PlotLabel -> " a1α - Temp. Range: 300 - 1500 K; Increments: 100 K",
    DisplayFunction → Identity], {T, 100, 1500, 100}]
Show[Plot1prime,
  Epilog → {Hue[0], Arrow[{{0.2, -0.05}, {.4, .8}}], Hue[.9],
    Text["Inc. Temp.", {.4, .8}, {0, -1}]},
  DisplayFunction -> $DisplayFunction]

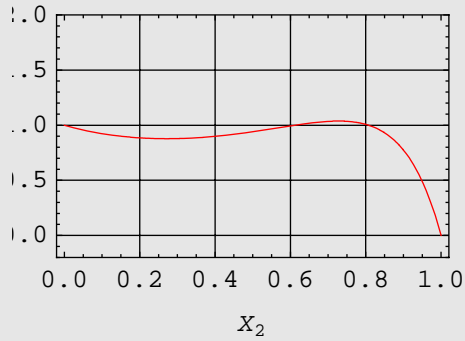
```

Out[48]=

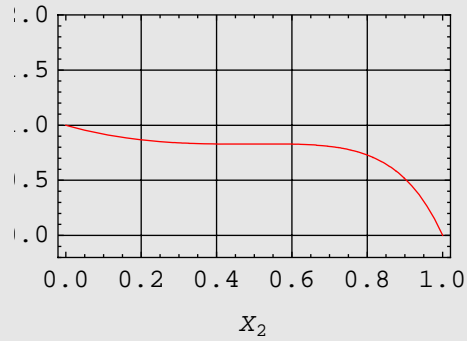
Age: 300 - 1500 K; Inc



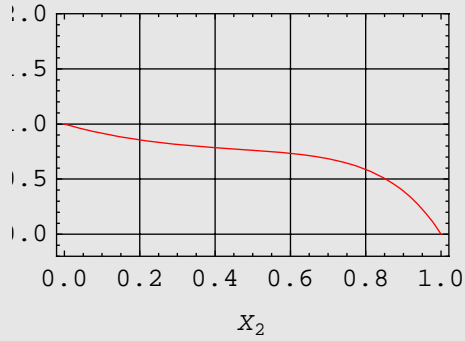
Age: 300 - 1500 K; Inc



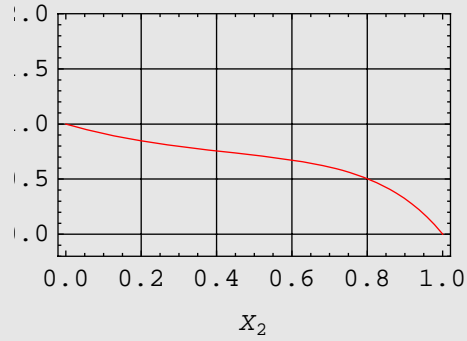
Age: 300 - 1500 K; Inc



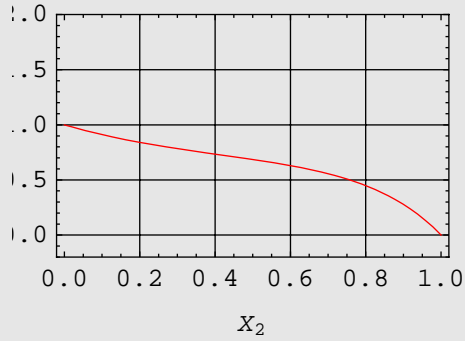
Age: 300 - 1500 K; Inc



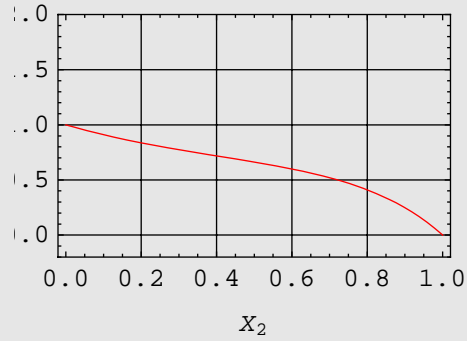
Age: 300 - 1500 K; Inc



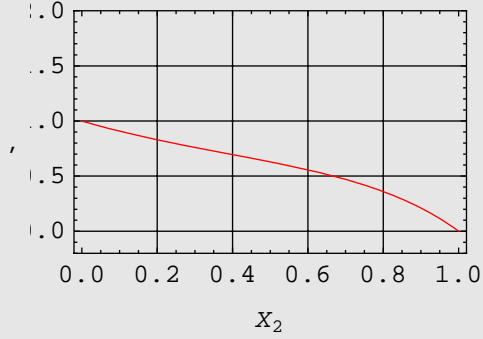
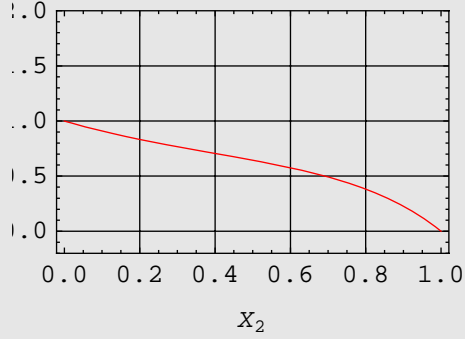
Age: 300 - 1500 K; Inc



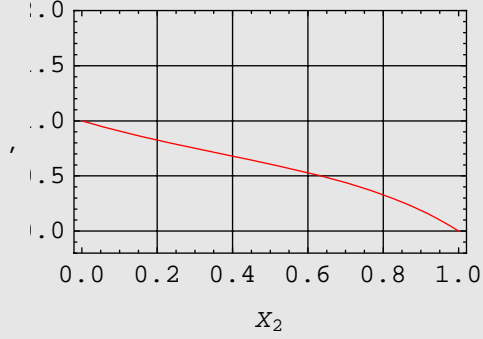
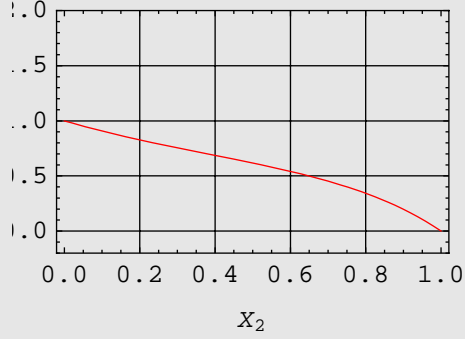
Age: 300 - 1500 K; Inc



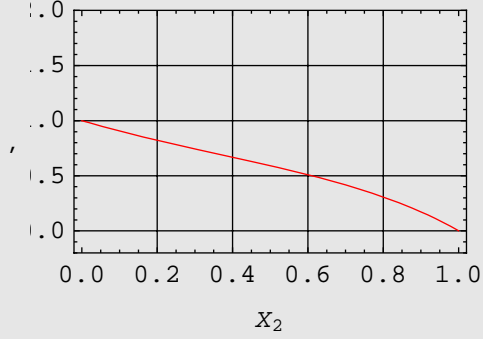
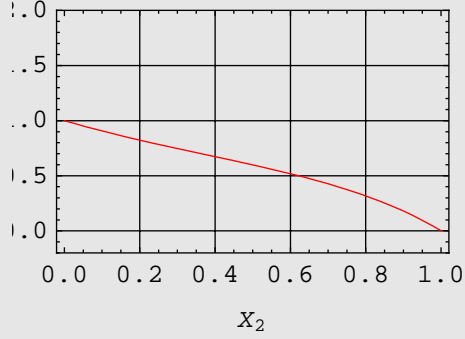
Age: 300 - 1500 K; Inc Age: 300 - 1500 K; Inc

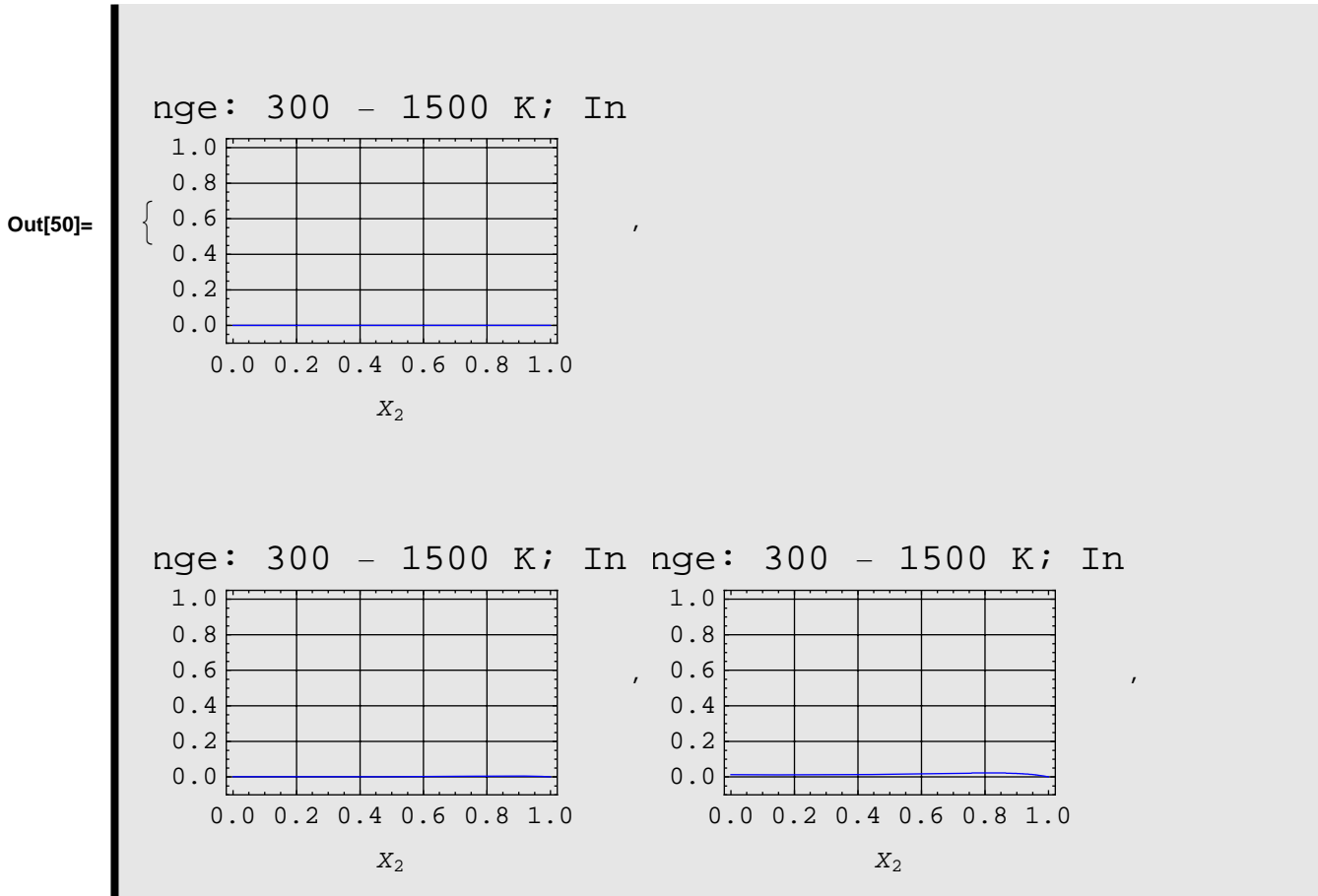
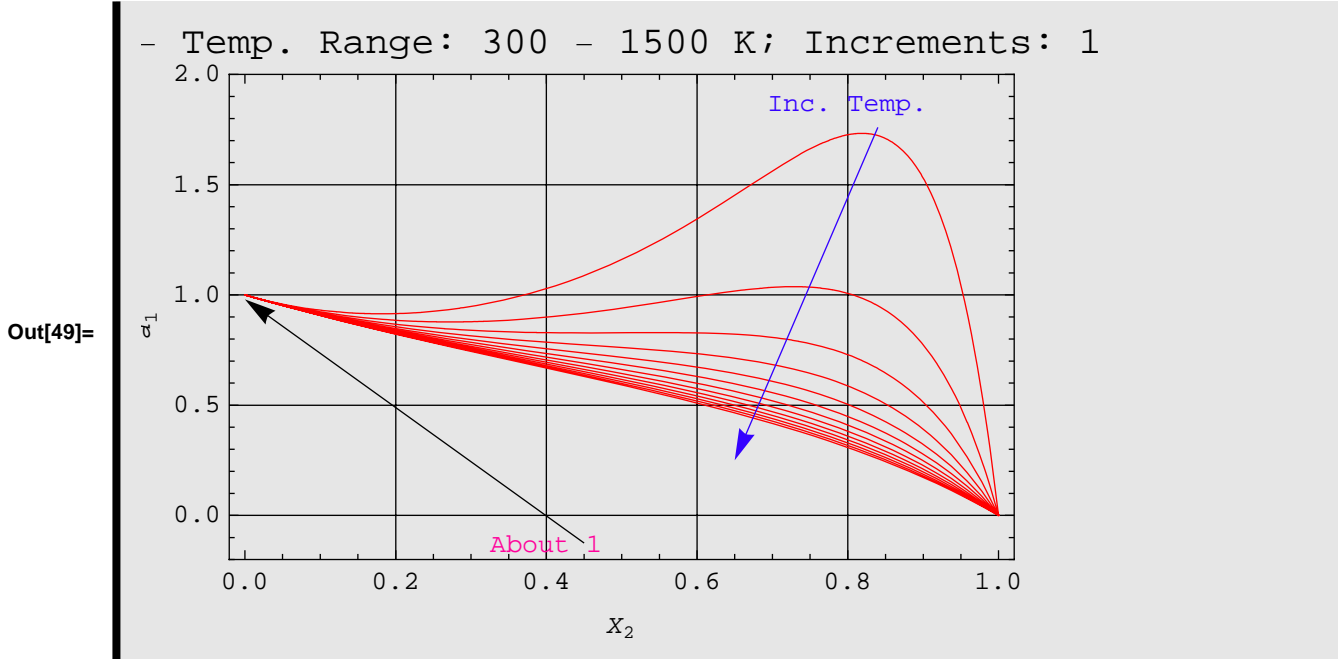


Age: 300 - 1500 K; Inc Age: 300 - 1500 K; Inc

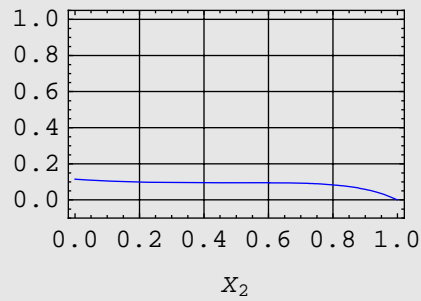
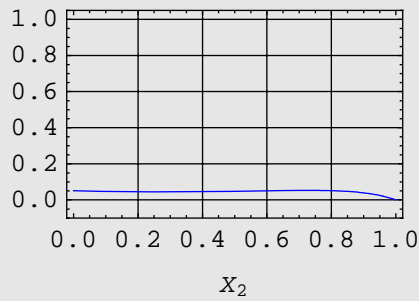


Age: 300 - 1500 K; Inc Age: 300 - 1500 K; Inc

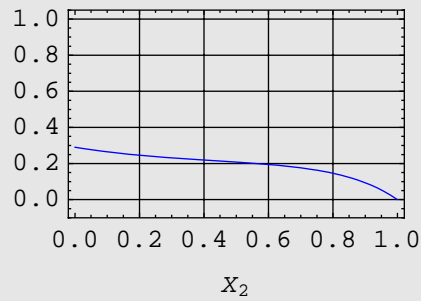
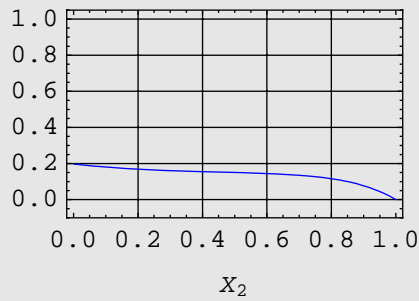




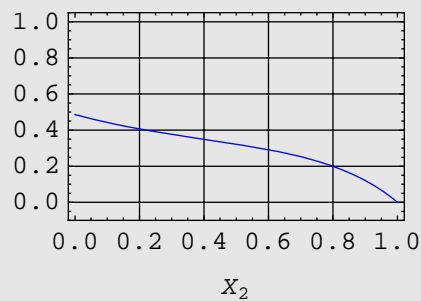
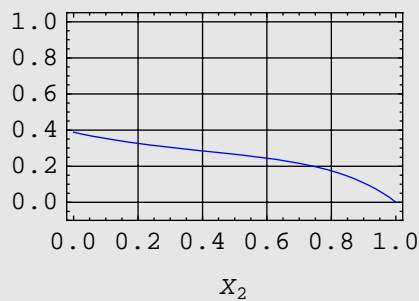
nge: 300 - 1500 K; In nge: 300 - 1500 K; In



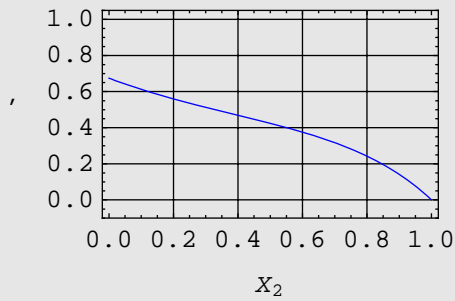
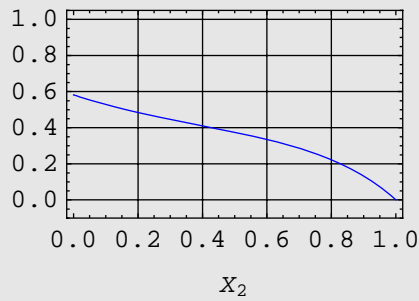
nge: 300 - 1500 K; In nge: 300 - 1500 K; In



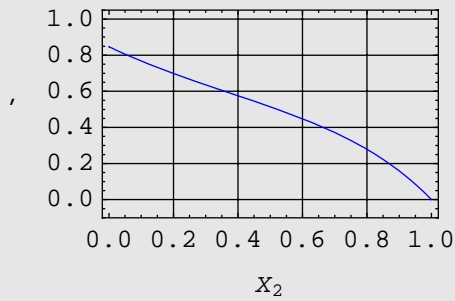
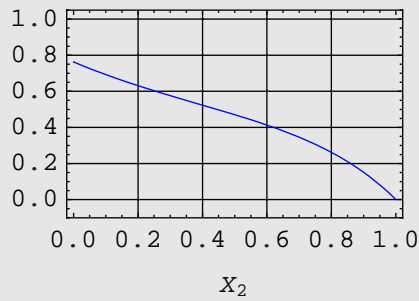
nge: 300 - 1500 K; In nge: 300 - 1500 K; In



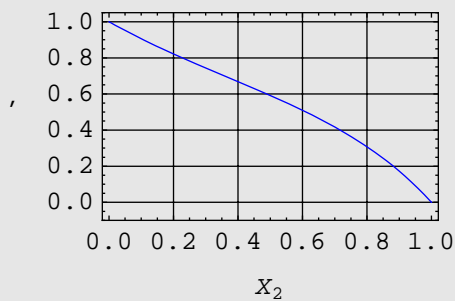
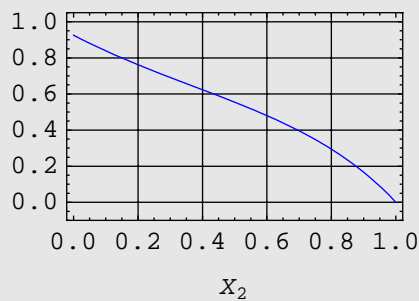
nge: 300 - 1500 K; In nge: 300 - 1500 K; In

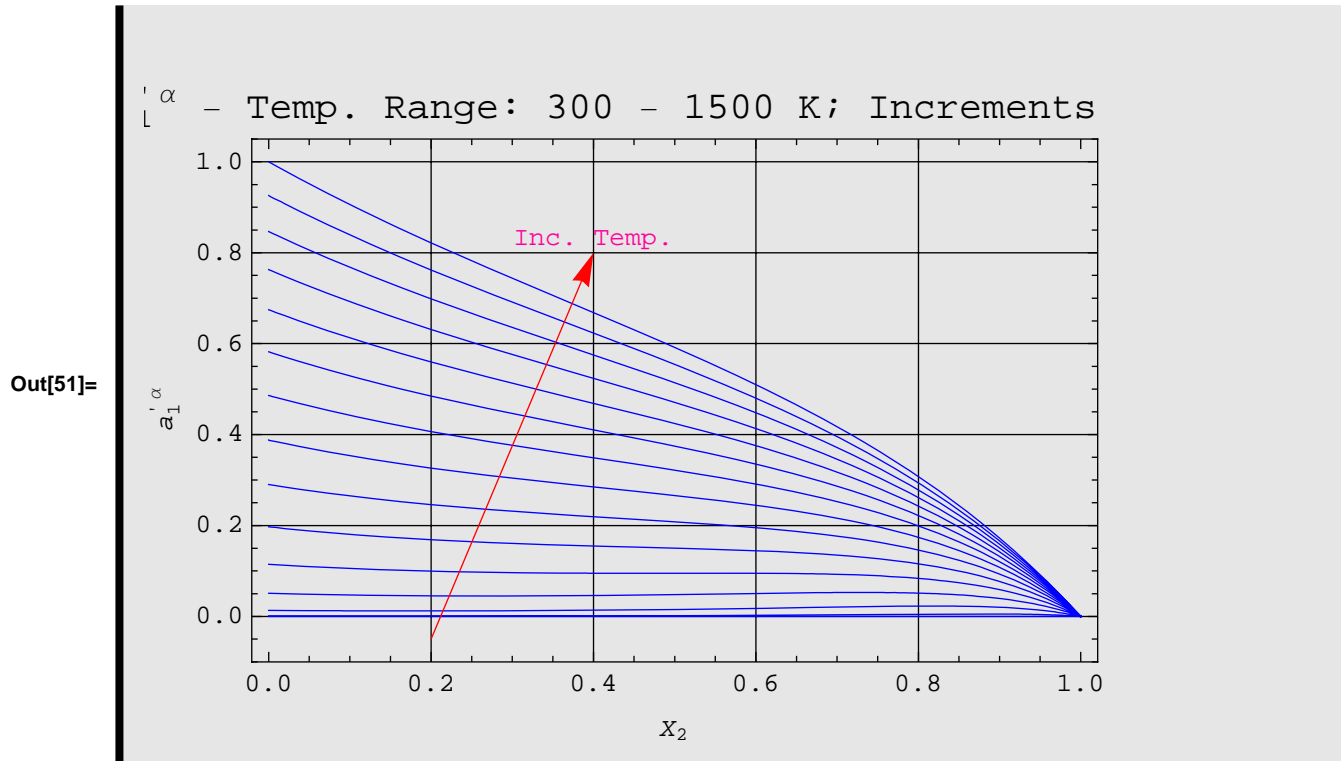


nge: 300 - 1500 K; In nge: 300 - 1500 K; In



nge: 300 - 1500 K; In nge: 300 - 1500 K; In

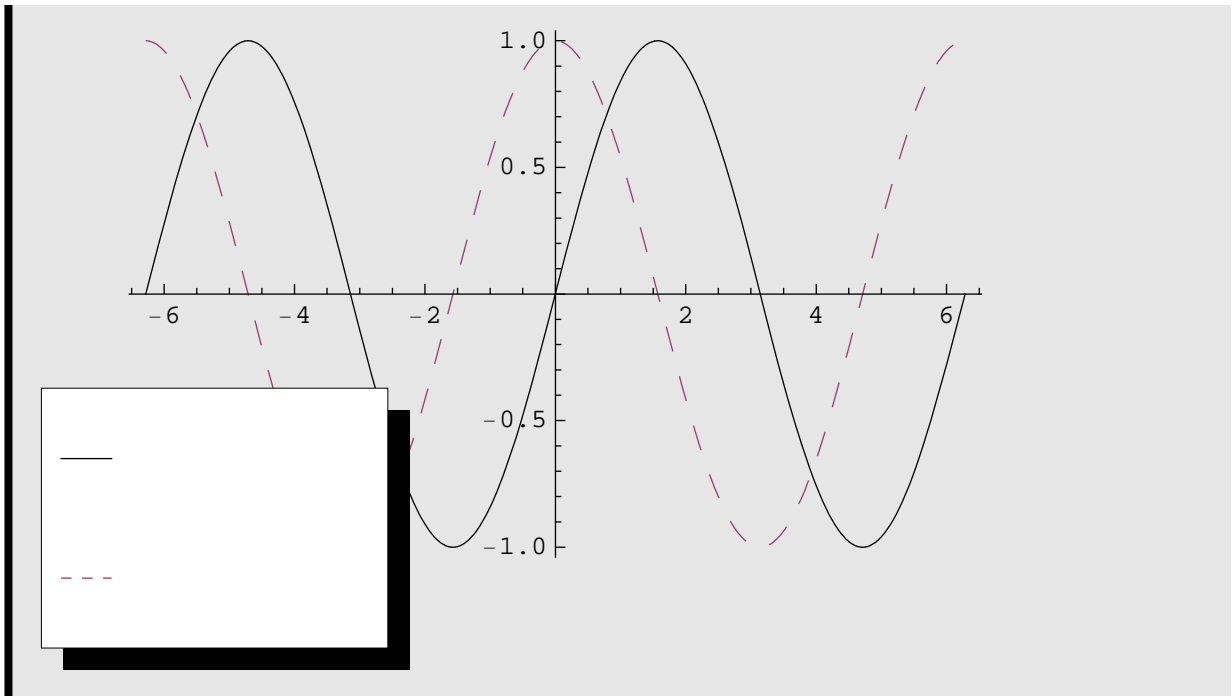




Legends: They are in the graphics package and need to be loaded.

```
In[52]:= << "PlotLegends`"
Plot[{Sin[x], Cos[x]}, {x, -2 π, 2 π},
PlotStyle → {GrayLevel[0], Dashing[{0.03`}]},
PlotLegend → {"Sine", "Cosine"}]
```

Out[53]=



Legends : Further discriptions of legends are found below with an example.

<i>option name</i>	<i>default value</i>	
LegendSpacing	Automatic	space around each key box in the legend, expressed as the ratio of the space allocated next to the key boxes for text, expressed as in <code>Leger</code>
LegendTextSpace	Automatic	space allocated for the legend label, as in <code>LegendSpacing</code>
LegendLabelSpace	Automatic	space allocated around the entire legend, as in <code>LegendSpacing</code>
LegendBorderSpace	Automatic	style for a border line around the legend box, can only be used if <code>Leg</code>
LegendBorder	Automatic	style for a background to the legend, can only be used if <code>LegendSh</code>
LegendBackground	Automatic	color for the legend's drop-shadow
ShadowBackground	GrayLevel[0]	

In[54]:=

```
<< "PlotLegends`"  
Plot[{Sin[x], Cos[x]}, {x, 0, 2  $\pi$ },  
PlotStyle -> {GrayLevel[0], {GrayLevel[0], Dashing[{0.03`}]}},  
PlotLegend -> {"sin", "cos"}, LegendPosition -> {0.5`, -0.7`},  
LegendTextSpace -> 0.5`, LegendLabel -> "Trig Funcs",  
LegendLabelSpace -> 0.5`, LegendOrientation -> Horizontal,  
LegendBackground -> GrayLevel[0.5`], LegendShadow -> {0.1`, -0.2`},  
Background -> GrayLevel[0.8`]]
```

Out[55]=

