### **Example 3.2.6 Diffusion with Second Order Reaction**

> restart:

> with(plots):

Enter the governing equation:

> Eq:=diff(c(x),x$2)=Phi^2\*c(x)^2;



The value of the parameter is substituted here:

> eq:=subs(Phi=1,Eq);



The boundary conditions are entered here:

> BCs:=(D(c)(0),D(c)(1)=100\*(1-c(1)));



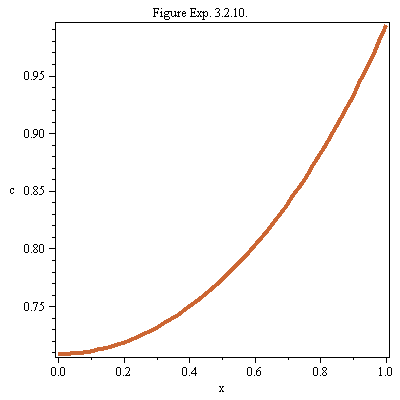
The numerical solution is obtained here:

> sol:=dsolve({eq,BCs},{c(x)},numeric);



The concentration profile obtained is plotted here:

> odeplot(sol,[x,c(x)],0..1,thickness=4,title="Figure Exp. 3.2.10.",axes=boxed,color=gold);



Next, the problem is solved for a higher value of Φ:

> eq:=subs(Phi=10,Eq);



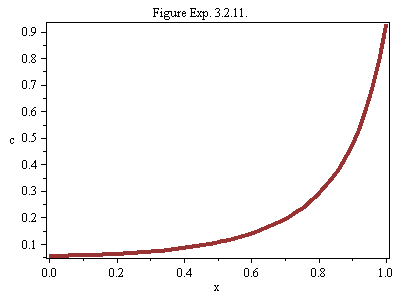
> BCs:=(D(c)(0),D(c)(1)=100\*(1-c(1)));



> sol:=dsolve({eq,BCs},{c(x)},numeric);



> odeplot(sol,[x,c(x)],0..1,thickness=4,title="Figure Exp. 3.2.11.",axes=boxed,color=brown);



We observe that as Φ increases, the profile becomes steeper and the time taken to solve the problem also increases.

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