Problem-1

$$v = f(T)$$
$$f_4(T) = f(T_0) + (T - T_0)f[T_1, T_0] + (T - T_0)(T - T_1)f[T_2, T_1, T_0] + (T - T_0)(T - T_1)(T - T_2)f[T_3, T_2, T_1, T_0]$$

$$f[T_1, T_0] = \frac{f(T_1) - f(T_0)}{T_1 - T_0}$$
$$f[T_2, T_1, T_0] = \frac{f[T_2, T_1] - f[T_1, T_0]}{x_2 - x_1}$$

I implemented this with the help of recursions in matlab.

Output

```
>> T1_20110065(750)

ans =

   0.091925000000010
```

The output is obviously wrong as anyone looking at the table would be able to say. The reason behind that is that the second derivative turns negative after i=1, 2. This straightaway leads to a decrease in $f_n(x)$ as per the equation when it shouldn't.

Here's an excel chart showing the entries.

T	v	First	Second	Third
700	0.0977	0.001207	-6.725E-06	2.3125E-08
720	0.12184	0.000938	-5.3375E-06	2.33333E-08
740	0.1406	0.0007245	-3.9375E-06	
760	0.15509	0.000567		
780	0.16643			

In my perspective, either the algorithm is wrong or there is a typo in the book. Because there is simply no error in the code, I have checked a zillion times! 😪