Problem 4.43 of SvN&A

```
> restart;
> R := 8.314;
  cp := (T,A,B,C,D) -> R*(A + B*1e-3*T + C*1e-6*T^2 + D*1e5/T^2);
  delh := (T0,T,A,B,C,D) -> int(cp(t,A,B,C,D),t=T0..T);
```

$$R := 8.314$$

$$cp := (T, A, B, C, \mathrm{D}) \rightarrow R\left(A + .001\ B\ T + .1\ 10^{-5}\ C\ T^2 + 100000.\ \frac{\mathrm{D}}{T^2}\right)$$

$$delh := (T0, T, A, B, C, \mathrm{D}) \rightarrow \int_{T0}^{T} \mathrm{cp}(t, A, B, C, \mathrm{D})\ dt$$

```
> delh1 := T -> 1.9*delh(303,T,3.639,0.506,0,-0.227) +
  16.082*delh(303,T,3.280,0.593,0,0.040);
```

$$delh1 := T \rightarrow 1.9\ \mathrm{delh}(303, T, 3.639, .506, 0, -.227) + 16.082\ \mathrm{delh}(303, T, 3.280, .593, 0, .040)$$

```
> delh2 := 2.375*delh(303,298,3.639,0.506,0,-0.227) +
  0.75*delh(303,298,1.072,9.081,-2.164,0)+0.25*delh(303,298,1.131,19
  .225,-5.561,0);
```

$$delh2 := -528.4473405$$

```
> delh3 := T -> 1.25*delh(298,T,5.547,1.045,0,-1.157) +
  2.25*delh(298,T,3.47,1.45,0,.121);
```

$$delh3 := T \rightarrow 1.25\ \mathrm{delh}(298, T, 5.547, 1.045, 0, -1.157) + 2.25\ \mathrm{delh}(298, T, 3.47, 1.45, 0, .121)$$

```
> Q := -8e5;
  delh0 := 0.75*(-802625) + 0.25*(-1428652);
```

$$Q := -800000.$$

$$delh0 := -959131.75$$

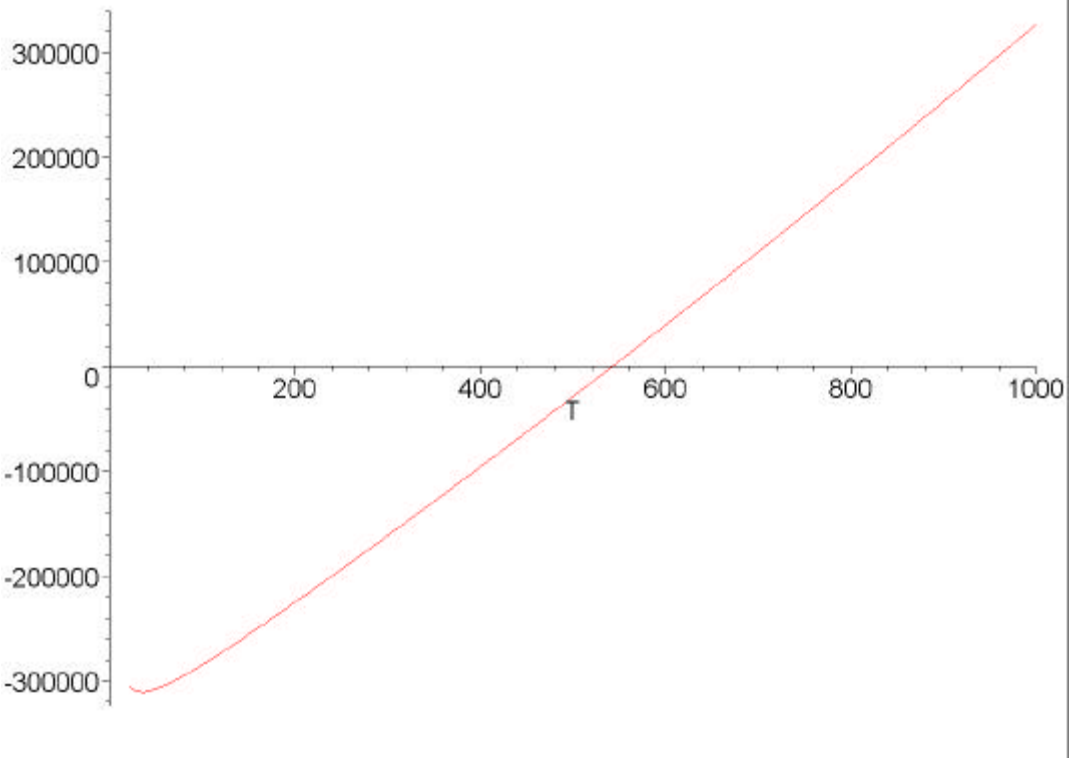
```
> solve(delh1(T)+delh2+delh3(T)+delh0=Q,T);
```

$$-10420.45205,\ 2.262780796,\ 541.5826227$$

```
> fsolve(delh1(T)+delh2+delh3(T)+delh0=Q,T,300..1000);
```

$$541.5826227$$

```
> plot(delh1(T)+delh2+delh3(T)+delh0-Q,T=0..1000);
```


300000
200000
100000
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