

Notebook to support Exercise 3.4.10, modeling a cooling potato.

The data, in time/temperature pairs:

```
In[35]:= data = {{0, 204}, {2, 193}, {4, 184}, {8, 169},  
             {10, 162}, {13, 156}, {17, 149}, {20, 143}, {24, 138}, {30, 130}}
```

The number of data points is

```
In[36]:= n = Length[data]
```

However, we will operate on the quantities $(t, \log(u(t)-A)-\log(u(0)-A))$, with $u(0)=204$ and $A = 72$.

```
In[44]:= logdata = Table[{data[[j, 1]], Log[data[[j, 2]] - 72] - Log[204 - 72]}, {j, 1, n}]
```

A plot:

```
In[45]:= plt1 =  
          ListPlot[logdata, AxesLabel → {"time (minutes)", "Temperature "}, PlotStyle → {Red}]
```

We seek to fit a line $y = -k \cdot t$ to this

```
In[46]:= u[t_] = -k * t
```

A least-squares function can be formed as

```
In[47]:= SS = Sum[(u[logdata[[j, 1]]] - logdata[[j, 2]])^2, {j, 1, n}]
```

Now adjust k to minimize this.