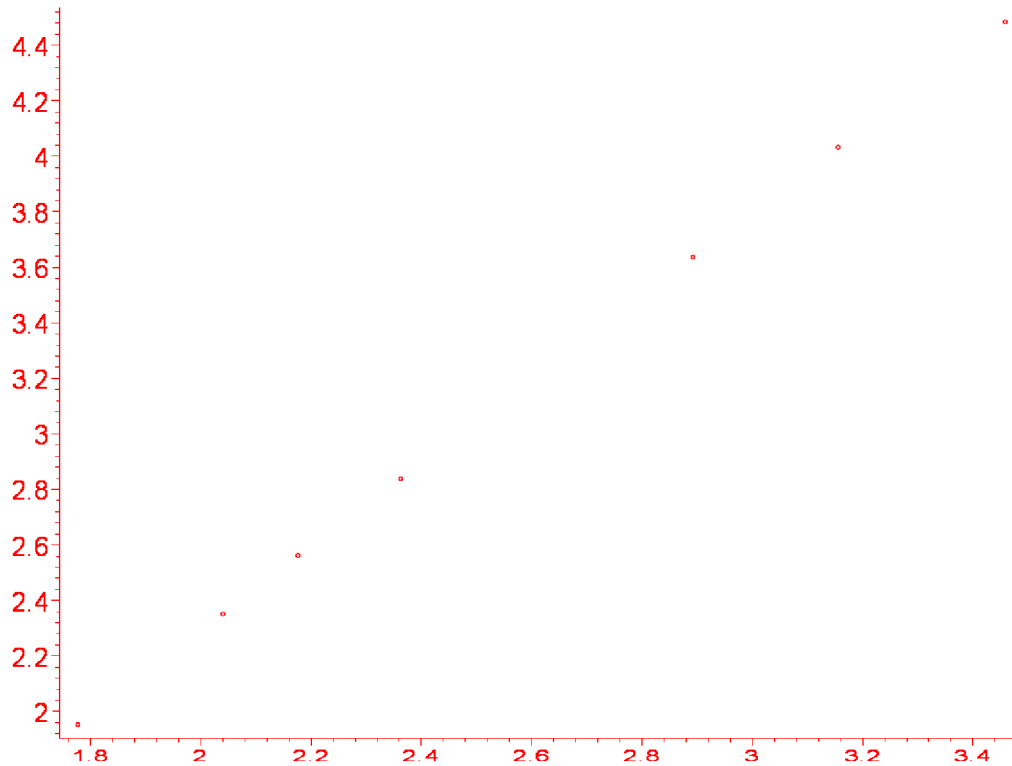# Solution to Problem Set 6, Problem 8

First we have to find which set of coordinates best fits in a line. Through simple trial-and-error, we find that plotting the coords in logr-logT will make the best line.

```
> PLOT(TITLE("log r versus log T"), AXESSTYLE(DEFAULT),
  SYMBOL(CIRCLE),
  POINTS([1.778,1.954],[2.041,2.352],[2.176,2.562],[2.362,2.839],[2.
  892,3.636],[3.155,4.031],[3.458,4.486]));
```

log r versus log T


```
> with(linalg):
```

To find the bestfit line, we put the following sums into a matrix and solve the matrix

```
> Sum(r) = 1.778+2.041+2.176+2.362+2.892+3.155+3.458;
> Sum(T) = 1.954+2.352+2.562+2.839+3.636+4.031+4.486;
> Sum(r^2) =
  1.778^2+2.041^2+2.176^2+2.362^2+2.892^2+3.155^2+3.458^2;
> Sum(r*T) = 1.778*1.954+2.041*2.352+2.176*2.562+2.362*2.839+2.892*
  3.636+ 3.155* 4.031+ 3.458* 4.486 ;
```

$$\sum r = 17.862$$

$$\sum T = 21.860$$

$$\sum r^2 = 47.916438$$

$$\sum r\,T = 59.300979$$

```
> AV-B=matrix([[7, 17.862],[17.862,47.916]])*matrix([[a],[b]]) -
  matrix([[21.860],[59.301]]);
```

$$AV - B = \begin{bmatrix} 7 & 17.862 \\ 17.862 & 47.916 \end{bmatrix} \begin{bmatrix} a \\ b \end{bmatrix} - \begin{bmatrix} 21.860 \\ 59.301 \end{bmatrix}$$

```
> solve( {7*a + 17.862*b = 21.860, 17.862*a + 47.916*b = 59.301},
  {a,b} );
```

$$\{ b = 1.506249390,\ a = -.7206609443 \}$$

This has b = 1.506 and a = -0.721, and therefore y = bx + a. We can take two points on this line and plot the line between them on the same plot as before to see how it stacks up.

```
> PLOT(TITLE("log r versus log T"),
  AXESSTYLE(DEFAULT),POINTS([1.778,1.954],[2.041,2.352],[2.176,2.562
  ],[2.362,2.839],[2.892,3.636],[3.155,4.031],[3.458,4.486]),
  SYMBOL(CIRCLE), CURVES([[0,-0.721],[5,6.809]], LINESTYLE(4)));
```


log r versus log T