Fiting function to data
- single variable, linear on parameters

$$T := \begin{pmatrix} -36.7 \\ -19.6 \\ -11.5 \\ -2.6 \\ 7.6 \\ 15.4 \\ 26.1 \\ 42.2 \\ 60.6 \\ 80.1 \end{pmatrix} \qquad p := \begin{pmatrix} 1 \\ 5 \\ 10 \\ 20 \\ 40 \\ 60 \\ 100 \\ 200 \\ 400 \\ 760 \end{pmatrix} \qquad T := T + 273$$

for $i \in 1 .. \text{length}(p)$
$y_i := \log10(p_i)$

$$T = \begin{pmatrix} 236.3 \\ 253.4 \\ 261.5 \\ 270.4 \\ 280.6 \\ 288.4 \\ 299.1 \\ 315.2 \\ 333.6 \\ 353.1 \end{pmatrix} \qquad y = \begin{pmatrix} 0 \\ 0.699 \\ 1 \\ 1.301 \\ 1.6021 \\ 1.7782 \\ 2 \\ 2.301 \\ 2.6021 \\ 2.8808 \end{pmatrix}$$

//The expression we are interested in
//T-independent variable, b-vector of unknown parameters

$$\log10(p) \equiv b_1 + \frac{b_2}{T} + b_3 \cdot \log10(T) + b_4 \cdot T^2$$

//from the function above we construct a vector function

$$\varphi(x) := \begin{pmatrix} 1 \\ \frac{1}{x} \\ \log10(x) \\ x^2 \end{pmatrix}$$

$n := \text{length}(T)$ $\quad k := \text{length}(\varphi(x))$

$n = 10$ $\quad k = 4$

//X-matrix, matrix of experiment

for $j \in 1 .. k$
  for $i \in 1 .. n$
    $X_{i,j} := \varphi(T_i)_j$

$\Phi := X^T \cdot X \qquad d := X^T \cdot y$

$b := \text{eval}(\Phi^{-1}) \cdot d$

$$b = \begin{pmatrix} 216.2057 \\ -9295.4875 \\ -75.5676 \\ 4.4384 \cdot 10^{-5} \end{pmatrix}$$

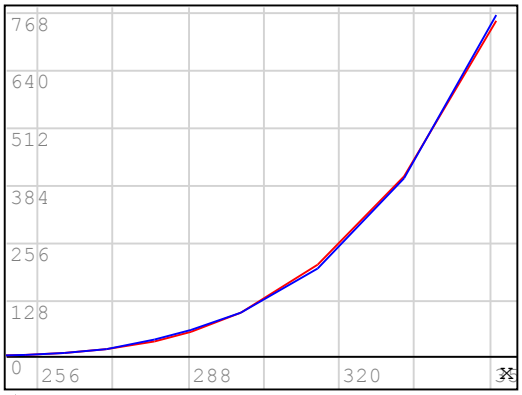
//Unknown parameters
//found in the least-square sense

$$pcalc(x) := eval\left(10^{b\cdot\varphi(x)}\right)$$

for $i \in 1 .. length(T)$

$pc_i := pcalc(T_i)$

	Calculated	Given
pc=	0.9757	
	5.2798	
	10.2648	
	19.6372	
	37.7525	
	58.8916	
	101.516	
	205.2468	
	404.3377	
	750.7548	
p=		1
		5
		10
		20
		40
		60
		100
		200
		400
		760



Data
Fit

augment(T, p)
augment(T, pc)

//The standard error of function:

$$s := \sqrt{\frac{1}{n-k}\cdot(p-pc)^2}$$

s= 4.8421

//END