

例題 6.3

(I) 重み付き線形最小二乗法 表計算 (9.12)-(9.16), (9.19),(9,20)

data #	x	y	$\delta y$	$w=1/(\delta y)^2$	$w \times x$	$w \times x^2$	$w \times y$	$w \times xy$	$w(y-A-Bx)^2$
1	0.003333	-15.04	0.1855	29.06110825	0.096860674	0.000322837	-437.079068	-1.456784534	2.822581056
2	0.00303	-14.03	0.154	42.16562658	0.127761849	0.000387118	-591.5837409	-1.792498735	0.495001536
3	0.0025	-12.53	0.02457	1656.493313	4.141233282	0.010353083	-20755.86121	-51.88965303	0.623825961
4	0.002	-11.18	0.005654	31281.55918	62.56311837	0.125126237	-349727.8317	-699.4556633	0.01096817
5	0.001667	-10.29	0.003116	102992.3819	171.6883006	0.286204397	-1059791.609	-1766.672613	0.829478729
6	0.001429	-9.66	0.001881	282632.701	403.8821297	0.577147563	-2730231.892	-3901.501373	0.183911035
				418634.3621	642.4994045	0.999541235	-4161535.857	-6422.768586	4.965766487
				S	Sx	Sxx	Sy	Sxy	$\chi^2$
	$x=1/T$	$y=\ln\langle D \rangle$							
				5636.822726	-5.854663462	-2662.3722	0.013316288	8.617876143	-0.993241679
				$\Delta$	A	B	$\delta A$	$\delta B$	$r_{AB}$

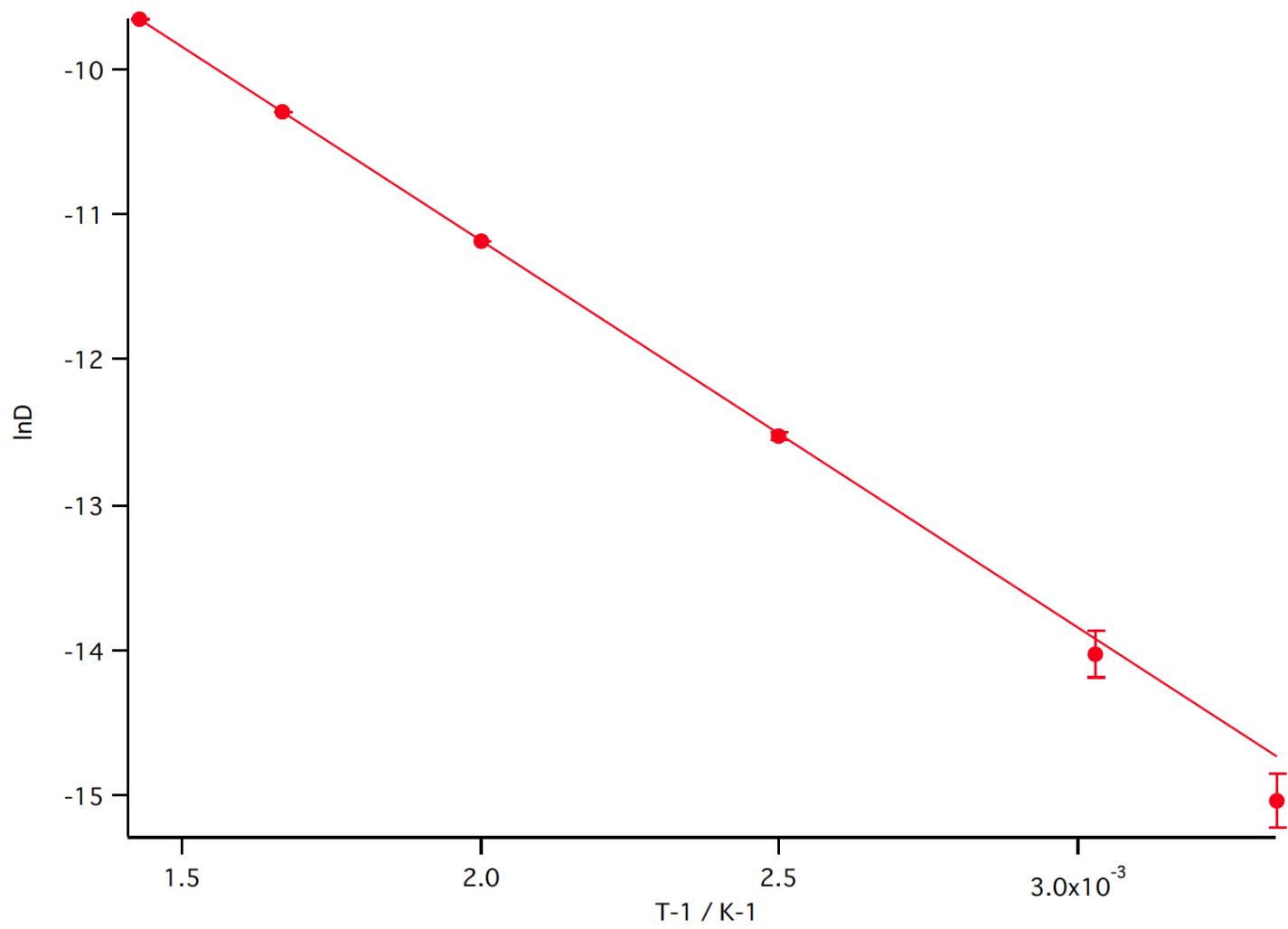
$x, y, \delta y$  でグラフソフトで計算 重みは  $w=1/(\delta y)^2$

(II) GNUPLOT

$A = -5.85466 \quad +/- 0.01484 \quad (0.2534\%)$   
 $B = -2662.37 \quad +/- 9.602 \quad (0.3607\%)$

(III) Igor

$A = -5.8547 \quad +/- 0.0133$   
 $B = -2662.4 \quad +/- 8.62$



(IV) 規格化した重み(9.7)式を使った表計算 重みは(9.12)-(9.16), (9.17), (9.18)で用いた。

data #	x	y	$\delta y$	$w=1/(\delta y)^2$	規格化 w	$w \times x$	$w \times x^2$
1	0.003333	-15.04	0.1855	29.06110825	0.000416513	1.38824E-06	4.627E-09
2	0.00303	-14.03	0.154	42.16562658	0.000604331	1.83112E-06	5.5483E-09
3	0.0025	-12.53	0.02457	1656.493313	0.023741386	5.93535E-05	1.48384E-07
4	0.002	-11.18	0.005654	31281.55918	0.448337194	0.000896674	1.79335E-06
5	0.001667	-10.29	0.003116	102992.3819	1.476119371	0.002460691	4.10197E-06
6	0.001429	-9.66	0.001881	282632.701	4.050781206	0.005788566	8.27186E-06
				418634.3621	6	0.009208505	1.43257E-05
				S	S	Sx	Sxx
	$x=1/T$	$y=\ln\langle D \rangle$					
				1.15789E-06		-5.854663462	-2662.3722
				$\Delta$		A	B

$w \times y$	$w \times xy$	$w^2 \delta y^2$	$w^2 x^2 \delta y^2$	$-2w^2 x \delta y^2$	$w(y-A-Bx)^2$
-0.006264355	-2.08791E-05	5.9696E-09	6.63156E-14	-3.97933E-11	4.04541E-05
-0.008478765	-2.56907E-05	8.66146E-09	7.952E-14	-5.24885E-11	7.09452E-06
-0.297479563	-0.000743699	3.40269E-07	2.12668E-12	-1.70135E-09	8.94087E-06
-5.012409826	-0.01002482	6.42571E-06	2.57028E-11	-2.57028E-08	1.57199E-07
-15.18926833	-0.02532051	2.11562E-05	5.87908E-11	-7.05348E-08	1.18884E-05
-39.13054645	-0.055917551	5.80571E-05	1.18555E-10	-1.65927E-07	2.63587E-06
-59.64444728	-0.092053149	8.59939E-05	2.05321E-10	-2.63958E-07	7.11709E-05
Sy	Sxy	sum above	sum above	sum above	$\chi^2$
0.013316288	8.617876143	1.76483E-14	1.74105E-14	-3.4821E-14	-0.993241679
$\delta A$	$\delta B$	sum $w^2 w^2$ $\delta y^2 S_{xx}^2$	sum $w^2 x^2$ $\delta y^2 S_x^2$	sum $-2w^2 x \delta y^2$ $2S_{xx} S_x$	$r_{AB}$
9.17 式	9.18 式	7.39156E-09	7.29199E-09	-1.4584E-08	
		sum $w^2 x^2$ $\delta y^2 S^2$	sum $w^2 \delta$ $y^2 S_x^2$	sum $-2w^2 x \delta$ $y^2 S S_x$	

$A \pm \delta A$ ,  $B \pm \delta B$  は全ての方法(I)-(IV)で一致しました。