

$$\vec{w} = \vec{F} \cdot \vec{a}$$

$$\rightarrow \vec{v} = \vec{E} \cdot \vec{a} \quad (\Rightarrow) \vec{E} = \vec{v}$$

$$F_0 = E \cdot |q|$$

$$\vec{F} = m \cdot \vec{a}$$

$$\Rightarrow m \cdot a = \frac{v}{d} |q|$$

$$(+) a = \frac{|q|}{dm} = \frac{E}{dm} \approx \frac{2,16 \times 10^{-18}}{0,01 \times 9,1 \times 10^{-31}}$$

B'

Aatividade LFI-TB - Verificação experimental da lei de Newton
do aquecimento.

Estudo da solidificação da parafina

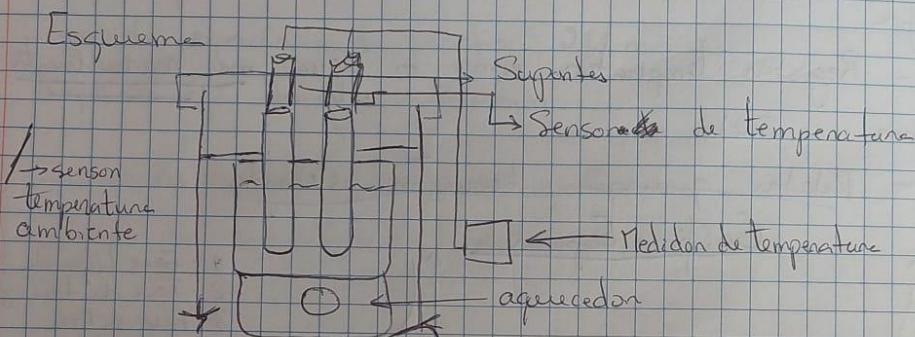
PL3 - Francisco Ferreira

Objetivos:

- Verificação experimental da lei de Newton que rege a variação da temperatura de um corpo em aquecimento na atmosfera (parafina e água)
- Determinação da temperatura de transição de fase líquido/sólido da parafina
- Parametrização da experiência, tendo em vista o ajuste pelo método dos mínimos quadrados
- Introdução à aquisição automática de dados

Materiais: - Dois tubos de ensaio, um contendo parafuso e outro contendo água.

- Suporte fixo
- Gobelete com água
- Disco elétrico
- Fica
- Dois termômetros



Atenções em relação ao logger Pro

- ~~Verificação da lei de Newton~~
- Intervalos 1/10 da interface de aquisição na posição "1"
- Verificar que o cabo do termômetro da água está conectado ao sensor de temperatura

- Ao abrir o "Logger Pro Temperaturas", selecionar "data collection" e escolher os parâmetros sequencialmente em "mude" e em "Sampling".
- ~~Configuração stable, lá~~

tempo	T ₁	T ₂

T₁ - temperatura da água

T₂ - temperatura ambiente

- Escolher "collect" no menu principal
- Registrar os dados $\Theta(t)$ (intervalos de tempo de 10s recomendado)
 - Criar os dados "file → export data", com nome identificado para registrar no logbook

Fenômeno fusão - Solidificação

- Esperar até se apresentar transparente e $T_{\text{má}} \text{ ser}$ atingido
 - Registrar temperatura como a água, mas manualmente com cronômetro
 - Relatar quaisquer observações relevantes

Gráficos Esperados

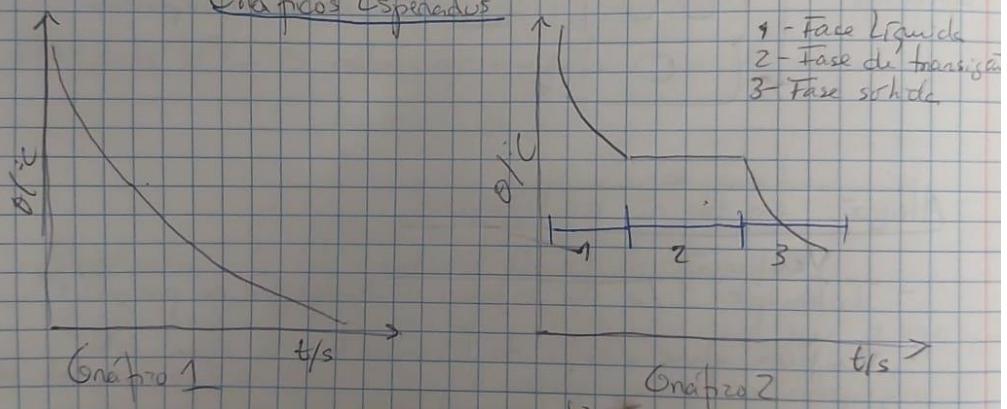
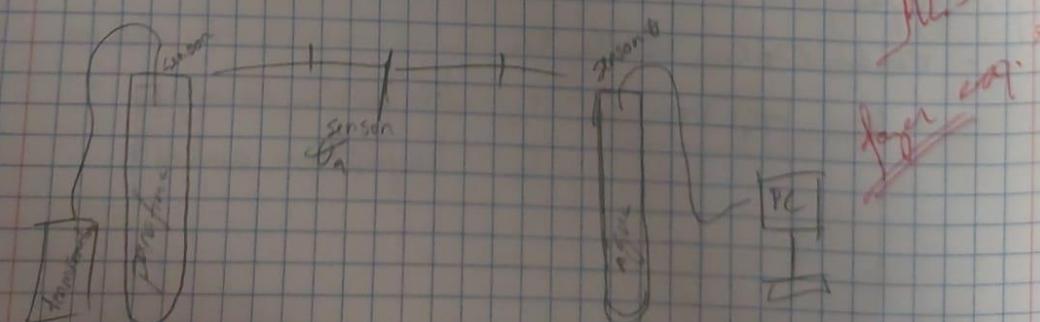
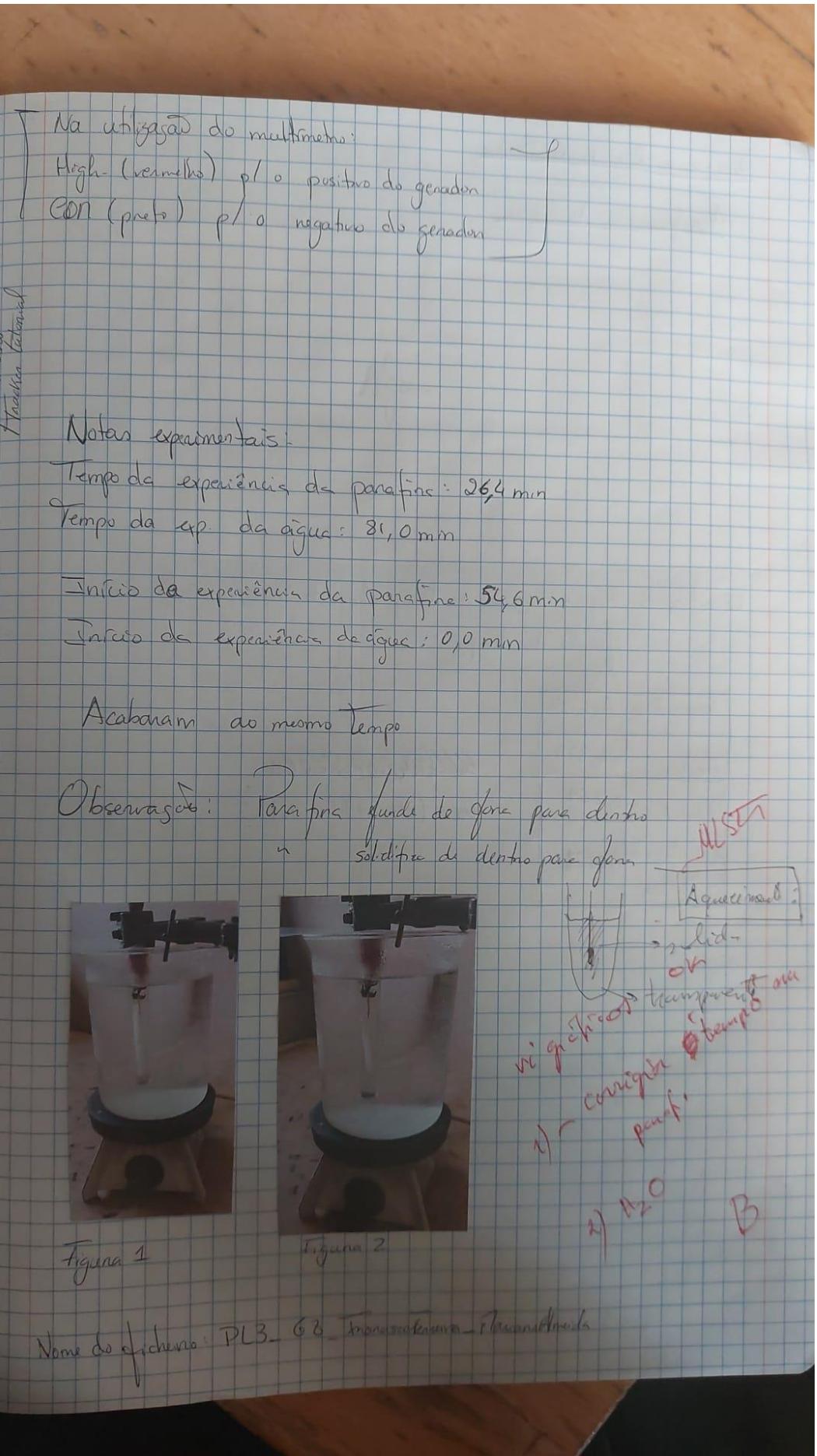


Gráfico 1 - Evolução temporal ^{esperada} de um líquido

Gráfico 2 - Evolução temporal esperada da temperatura de um líquido na transição líquido/sólido de um material





Análise e Registro de Dados

Arrefecimento da água

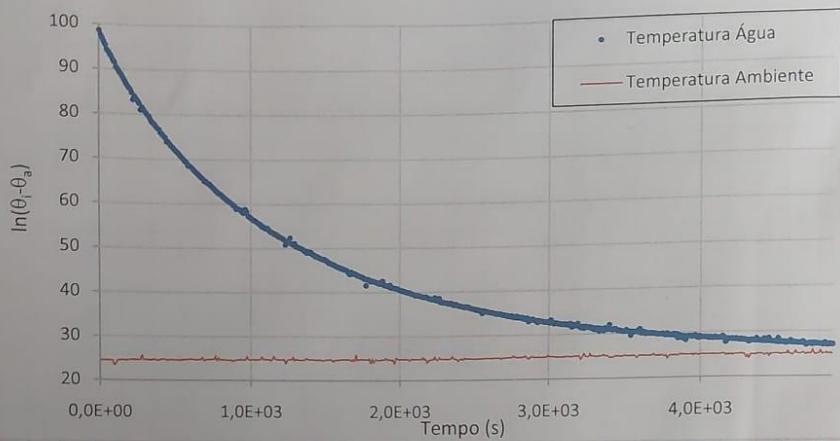


Gráfico 3: Representação da temperatura da água/ambiente em função do tempo.

Temperatura Ambiente	
Média	24,879
Desvio Padrão	0,269
Incerteza da Média	0,0121

24,879 ± 0,0121
 $\theta_a = (24,879 \pm 0,012)^\circ\text{C}$

mais formatação
algumas marcas
muito mal feito

$$\text{Linearização: } \ln(\theta(t) - \theta_a) = \underbrace{\ln(\theta_i - \theta_a)}_b + \underbrace{\left[-\frac{1}{\tau} \right] t}_m$$

Linearização do Arrefecimento da Água 1

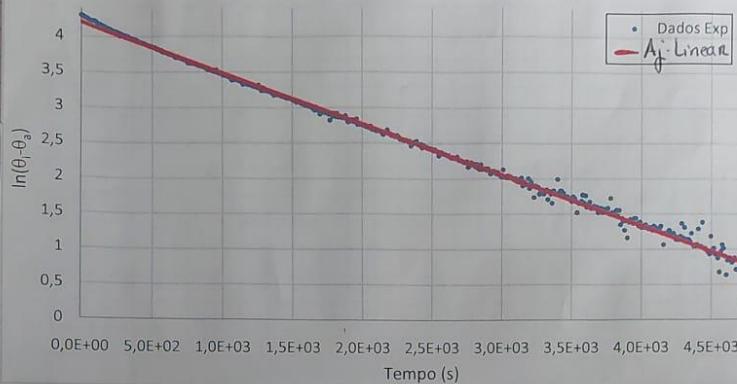


Gráfico 4: Representação $\ln(\theta - \theta_a)$ em função do tempo

Linearização 1		
m	-7E-04	4,210
σm	2E-06	0,006
r^2	0,996	0,06

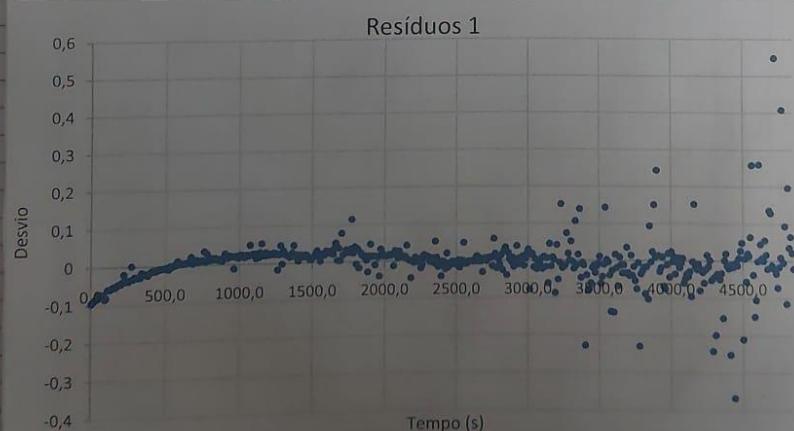
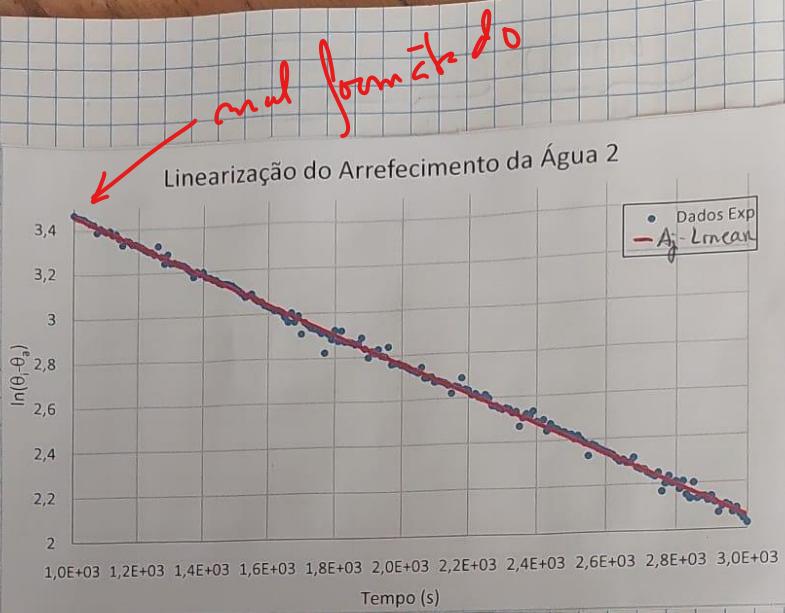


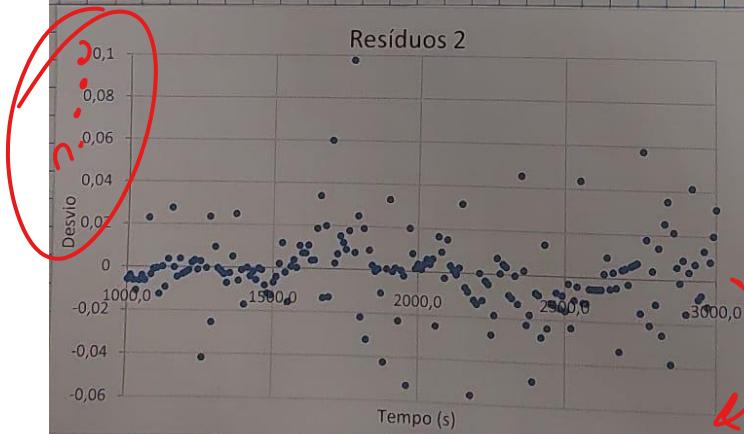
Gráfico 5: Resíduos da Linearização 1

→ Ao analisar os resíduos, conseguimos visualizar uma tendência entre os 0 e os 1000s e, após os 3000s os dados ficam algo desordenados, pelo que optamos por fazer uma linearização na qual apenas os valores dos resíduos obtidos entre os 1000 e os 3000s.



(Gráfico 6: Representação de $\ln(\theta - \theta_a)$ em função do tempo

Linearização 2			
m	-7.E-04	4,165	b
σ_m	2E-06	0,005	σ_b
r^2	0,998	0,02	σ_{ya}



→ Ao analisarmos estes resultados, conseguimos notar que de fato estes são bastante aleatórios. Isto significa que a ~~variação~~ é grande a questo linear se adequa aos dados registrados.

Grafico 7: Residuos de linearizacin 2

Fall in love in fact
give in due time

1) diminutive
2) adjective

Ondulado na origem	$\ln(\theta_i - \theta_a)$	4,165	0,005	Incertezas obtidas a partir dos parâmetros da reta de ajuste
Desvio	$-1/\tau$	-7×10^{-4}	2×10^{-6}	
Valor da Temperatura Inicial	$e^{\ln(\theta_i - \theta_a) + \theta_a}$	89,272		Incertezas obtidas através da "propagação" das incertezas
Tau	τ	1428,571		
Aproximação dos Resultados	Valores	Incertezas		

* Incerteza τ :

$$\left(\frac{u(\tau)}{\tau} \right)^2 = \left(\frac{-u(m)}{m} \right)^2 \Rightarrow u(\tau) = \sqrt{\frac{u(m)}{m}}$$

* Incerteza $\theta_i - \theta_a$:

$$u(e^{\ln(\theta_i - \theta_a)}) = u(\theta_i - \theta_a) = u(\theta_i - \theta_a) = u(\ln(\theta_i - \theta_a)) (\theta_i - \theta_a)$$

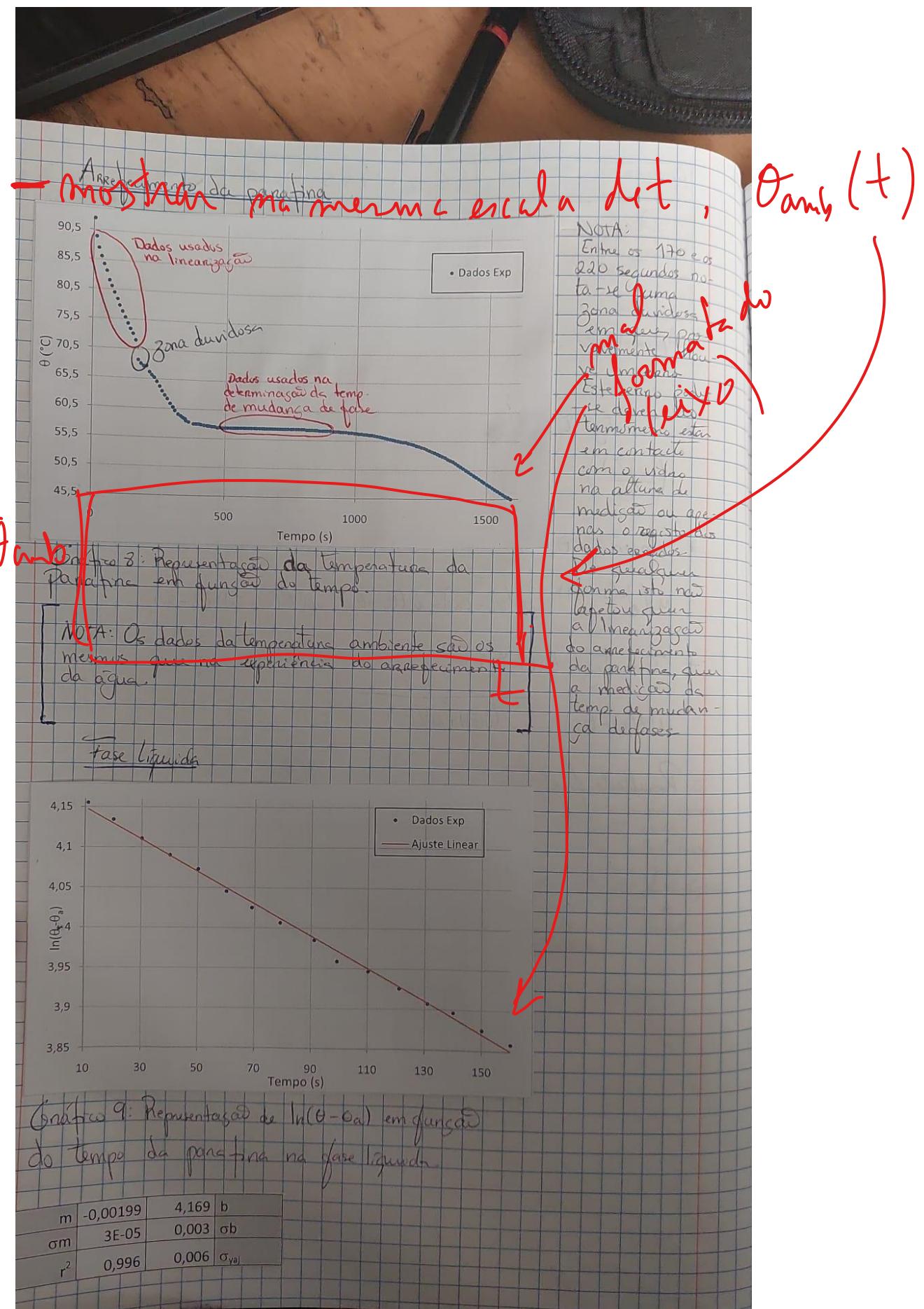
* Incerteza $\theta(t) - \theta_a$:

$$u(\theta(t) - \theta_a) = \sqrt{u^2(\theta(t)) + u^2(\theta_a)}$$

Resultado final:

$$\tau = (1428,571 \pm 4,087) \text{ s}$$

$$\theta_i - \theta_a = (64,392 \pm 0,012)^\circ\text{C}$$



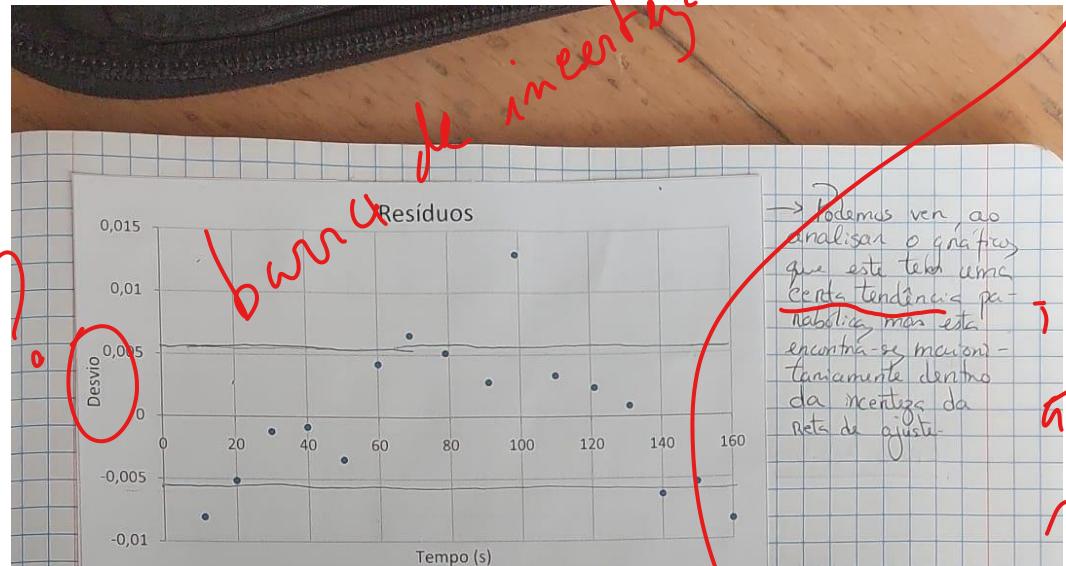


Gráfico 10: Resíduos da linearização feita no gráfico 9.

Determinação da temperatura de mudança de fase

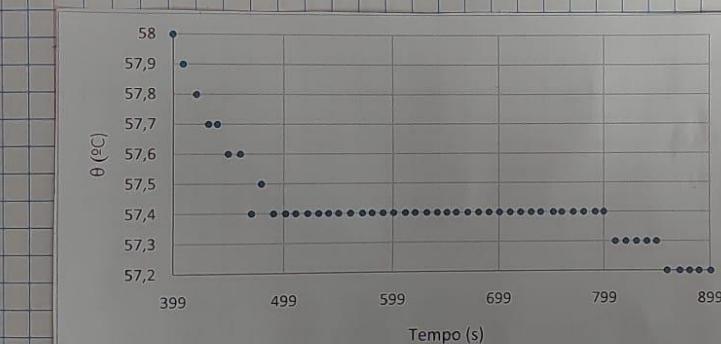


Gráfico 11: Ampliação do gráfico 8 por volta, da temperatura da mudança de fase da parafina.

Analizando os gráficos 8 e 11, conseguimos perceber que, no seu aquecimento, a temperatura da parafina desce até aos 57.4°C, onde se mantém constante durante 300s, o que indica que esta é a temperatura de mudança de fase experimental da parafina.



Assim, podemos concluir que o parafina está no seu estado líquido até aos 490 s, onde ~~ocorre~~, ali aos 800 s se dá a mudança de fase e, após esse período terminar, temos parafina sólida.

$$\text{Erro Relativo: } \frac{|57,4 - 56,9|}{56,9} = 0,88\%$$

Valor tabelado de θ de mudanças de fase da parafina:	56,9°C
Valor obtido	57,4°C

Conclusões:

→ é uma quebra 1 variável
57°/J

Resultados Finais?

- Verificamos que o tempo de relaxação térmica da parafina líquida é ~~de~~ 502 s e o da água é 1428 s. Esta diferença de resultados leva a acreditar que a água possui uma capacidade térmica superior à da parafina, ou seja, é necessário fornecer mais energia à água para a temperatura deste aumentar um grau. No entanto, como $T_L = \frac{m_e}{x}$, sendo m a massa da substância e c a sua capacidade térmica, teríamos de ter a certeza que a massa em ambos os tubos de ensaio era a mesma, o que não foi verificado.

- No que diz respeito à mudança de fase da parafina, obtivemos experimentalmente que esta ocorre a 57,4°C, sendo o valor esperado 56,9°C, o que nos deixa com um erro relativo de 0,88%, que é menor que 5%, o que nos leva a confiar na validade do resultado.

ANEXO:

Dados relativos ao arrefecimento da parafina

t (s)	θ °C (θ_a °C ($\pm 1E-9$)	$(\theta - \theta_a)$	$\ln (\theta - \theta_a)$	Ajuste Linear	Resíduos
			0	#NÚM!		
5	92,5	24,9580841	67,5	4,21	4,159	-0,0533
11	89,4	25,6144199	63,8	4,16	4,147	-0,0080
20	87,5	25,0310097	62,5	4,13	4,130	-0,0051
30	86,1	25,1039352	61,0	4,11	4,110	-0,0012
40	84,8	25,0310097	59,8	4,09	4,090	-0,0008
50	83,7	24,9580841	58,7	4,07	4,070	-0,0034
60	82,1	24,9580841	57,1	4,05	4,050	0,0043
69	81,1	25,1039352	56,0	4,03	4,032	0,0066
79	80	25,0310097	55,0	4,01	4,012	0,0052
91	78,9	25,1039352	53,8	3,99	3,988	0,0028
99	77,8	25,3956413	52,4	3,96	3,972	0,0131
110	76,8	25,0310097	51,8	3,95	3,950	0,0033
121	75,8	25,1039352	50,7	3,93	3,928	0,0023
131	74,8	25,0310097	49,8	3,91	3,908	0,0009
140	73,9	24,666378	49,2	3,90	3,890	-0,0063
150	73,1	24,8851566	48,2	3,88	3,870	-0,0053
160	72	24,5934525	47,4	3,86	3,850	-0,0083
170	68,7	24,8851566	43,8	3,78	3,831	0,0505
180	68,1	25,0310097	43,1	3,76	3,811	0,0478
190	67,7	24,9580841	42,7	3,76	3,791	0,0355
201	67,7	25,0310097	42,7	3,75	3,769	0,0152
212	66,7	24,8851566	41,8	3,73	3,747	0,0135
221	66,2	24,9580841	41,2	3,72	3,729	0,0094
230	65,8	24,9580841	40,8	3,71	3,711	0,0012
240	65,1	25,1039352	40,0	3,69	3,691	0,0022
251	64,3	25,0310097	39,3	3,67	3,669	-0,0014
260	63,5	24,9580841	38,5	3,65	3,651	-0,0007
270	62,8	25,0310097	37,8	3,63	3,631	-0,0004
280	62,2	24,9580841	37,2	3,62	3,611	-0,0062
291	61,4	25,1039352	36,3	3,59	3,589	-0,0024
301	60,8	25,0310097	35,8	3,58	3,569	-0,0077
309	60,2	24,9580841	35,2	3,56	3,553	-0,0089
321	59,6	24,520525	35,1	3,56	3,529	-0,0282
331	59,3	24,9580841	34,3	3,54	3,510	-0,0268
340	59	25,1039352	33,9	3,52	3,492	-0,0317
348	58,8	25,0310097	33,8	3,52	3,476	-0,0439
350	58,5	25,0310097	33,5	3,51	3,472	-0,0390
361	58,3	24,9580841	33,3	3,51	3,450	-0,0571
379	58	25,0310097	33,0	3,50	3,414	-0,0817

389		58	25,0310097	33,0	3,50	3,394	-0,1017
399		58	24,9580841	33,0	3,50	3,374	-0,1238
408		57,9	25,0310097	32,9	3,49	3,356	-0,1365
420		57,8	25,0310097	32,8	3,49	3,332	-0,1574
431		57,7	25,3956413	32,3	3,48	3,310	-0,1650
439		57,7	24,9580841	32,7	3,49	3,294	-0,1944
449		57,6	24,9580841	32,6	3,49	3,274	-0,2113
460		57,6	25,1039352	32,5	3,48	3,252	-0,2288
470		57,4	24,9580841	32,4	3,48	3,232	-0,2470
479		57,5	25,0310097	32,5	3,48	3,214	-0,2658
490		57,4	25,0310097	32,4	3,48	3,193	-0,2847
501		57,4	24,7393055	32,7	3,49	3,171	-0,3156
510		57,4	25,0310097	32,4	3,48	3,153	-0,3245
521		57,4	24,2288208	33,2	3,50	3,131	-0,3710
531		57,4	24,9580841	32,4	3,48	3,111	-0,3687
540		57,4	24,9580841	32,4	3,48	3,093	-0,3866
549		57,4	25,0310097	32,4	3,48	3,075	-0,4023
560		57,4	24,9580841	32,4	3,48	3,053	-0,4265
571		57,4	25,0310097	32,4	3,48	3,031	-0,4462
580		57,4	24,8851566	32,5	3,48	3,013	-0,4686
590		57,4	24,9580841	32,4	3,48	2,993	-0,4863
600		57,4	25,1039352	32,3	3,47	2,973	-0,5017
611		57,4	25,1768627	32,2	3,47	2,951	-0,5214
620		57,4	25,1768627	32,2	3,47	2,933	-0,5393
631		57,4	25,1039352	32,3	3,47	2,911	-0,5635
641		57,4	25,1039352	32,3	3,47	2,891	-0,5835
650		57,4	25,0310097	32,4	3,48	2,874	-0,6037
659		57,4	25,0310097	32,4	3,48	2,856	-0,6216
670		57,4	25,1039352	32,3	3,47	2,834	-0,6413
680		57,4	25,1039352	32,3	3,47	2,814	-0,6612
690		57,4	24,8851566	32,5	3,48	2,794	-0,6879
700		57,4	25,1039352	32,3	3,47	2,774	-0,7011
710		57,4	25,1039352	32,3	3,47	2,754	-0,7210
720		57,4	24,9580841	32,4	3,48	2,734	-0,7455
730		57,4	25,1039352	32,3	3,47	2,714	-0,7609
739		57,4	25,1768627	32,2	3,47	2,696	-0,7766
751		57,4	25,1039352	32,3	3,47	2,672	-0,8028
759		57,4	25,1768627	32,2	3,47	2,656	-0,8164
770		57,4	25,0310097	32,4	3,48	2,634	-0,8429
780		57,4	25,1039352	32,3	3,47	2,614	-0,8606
791		57,4	25,1039352	32,3	3,47	2,592	-0,8825
799		57,4	25,1768627	32,2	3,47	2,576	-0,8962
810		57,3	25,0310097	32,3	3,47	2,555	-0,9195
820		57,3	25,1039352	32,2	3,47	2,535	-0,9372
830		57,3	25,1039352	32,2	3,47	2,515	-0,9572

840		57,3	25,0310097	32,3	3,47	2,495	-0,9794
849		57,3	25,0310097	32,3	3,47	2,477	-0,9973
859		57,2	25,0310097	32,2	3,47	2,457	-1,0141
871		57,2	25,1768627	32,0	3,47	2,433	-1,0335
880		57,2	25,2497883	32,0	3,46	2,415	-1,0492
889		57,2	25,2497883	32,0	3,46	2,397	-1,0671
900		57,2	24,8122311	32,4	3,48	2,375	-1,1027
912		57,1	25,0310097	32,1	3,47	2,351	-1,1167
921		57,1	24,9580841	32,1	3,47	2,333	-1,1369
931		57,1	25,1039352	32,0	3,47	2,313	-1,1523
940		57	24,8851566	32,1	3,47	2,295	-1,1739
950		57	25,0310097	32,0	3,46	2,275	-1,1893
960		57	25,0310097	32,0	3,46	2,256	-1,2093
971		56,9	25,0310097	31,9	3,46	2,234	-1,2281
982		56,9	25,0310097	31,9	3,46	2,212	-1,2500
992		56,8	25,1039352	31,7	3,46	2,192	-1,2645
1000		56,8	25,1768627	31,6	3,45	2,176	-1,2781
1009		56,7	25,1039352	31,6	3,45	2,158	-1,2952
1020		56,7	25,0310097	31,7	3,46	2,136	-1,3194
1030		56,6	24,2288208	32,4	3,48	2,116	-1,3613
1040		56,6	24,8122311	31,8	3,46	2,096	-1,3631
1050		56,5	24,0829678	32,4	3,48	2,076	-1,4026
1060		56,5	24,9580841	31,5	3,45	2,056	-1,3952
1070		56,4	25,0310097	31,4	3,45	2,036	-1,4096
1080		56,3	24,9580841	31,3	3,44	2,016	-1,4287
1091		56,2	24,9580841	31,2	3,44	1,994	-1,4474
1100		56,1	25,1039352	31,0	3,43	1,976	-1,4575
1110		56	25,1039352	30,9	3,43	1,956	-1,4742
1119		55,9	25,1768627	30,7	3,43	1,939	-1,4865
1130		55,8	25,1039352	30,7	3,42	1,917	-1,5075
1140		55,7	25,0310097	30,7	3,42	1,897	-1,5266
1149		55,6	24,7393055	30,9	3,43	1,879	-1,5508
1160		55,5	25,0310097	30,5	3,42	1,857	-1,5599
1170		55,4	25,1039352	30,3	3,41	1,837	-1,5742
1180		55,3	24,520525	30,8	3,43	1,817	-1,6099
1190		55,3	25,1039352	30,2	3,41	1,797	-1,6107
1200		55,1	25,0310097	30,1	3,40	1,777	-1,6265
1210		55	25,1039352	29,9	3,40	1,757	-1,6406
1220		54,9	25,1768627	29,7	3,39	1,737	-1,6548
1230		54,7	25,1039352	29,6	3,39	1,717	-1,6704
1240		54,6	25,1768627	29,4	3,38	1,697	-1,6845
1250		54,4	25,0310097	29,4	3,38	1,677	-1,7026
1260		54,3	24,9580841	29,3	3,38	1,657	-1,7216
1270		54,1	25,1039352	29,0	3,37	1,637	-1,7297
1280		53,9	25,1039352	28,8	3,36	1,618	-1,7427

1290		53,7	25,0310097	28,7	3,36	1,598	-1,7582
1300		53,5	25,6144199	27,9	3,33	1,578	-1,7504
1311		53,3	25,0310097	28,3	3,34	1,556	-1,7860
1320		53,1	25,0310097	28,1	3,33	1,538	-1,7969
1330		52,9	24,7393055	28,2	3,34	1,518	-1,8201
1340		52,7	25,0310097	27,7	3,32	1,498	-1,8224
1350		52,4	25,6873455	26,7	3,29	1,478	-1,8072
1360		52,2	25,1039352	27,1	3,30	1,458	-1,8413
1370		52	25,0310097	27,0	3,29	1,438	-1,8566
1380		51,7	25,0310097	26,7	3,28	1,418	-1,8653
1390		51,4	25,1768627	26,2	3,27	1,398	-1,8684
1400		51,1	25,3956413	25,7	3,25	1,378	-1,8684
1410		50,8	25,0310097	25,8	3,25	1,358	-1,8908
1420		50,5	24,9580841	25,5	3,24	1,338	-1,9019
1430		50,2	25,1768627	25,0	3,22	1,318	-1,9013
1440		49,9	25,0310097	24,9	3,21	1,299	-1,9151
1450		49,6	25,0310097	24,6	3,20	1,279	-1,9229
1460		49,3	25,8331985	23,5	3,16	1,259	-1,8969
1470		49	25,1039352	23,9	3,17	1,239	-1,9350
1480		48,7	24,8851566	23,8	3,17	1,219	-1,9515
1489		48,4	25,0310097	23,4	3,15	1,201	-1,9506
1500		48,1	25,0310097	23,1	3,14	1,179	-1,9596
1510		47,8	25,760273	22,0	3,09	1,159	-1,9339
1520		47,5	24,9580841	22,5	3,12	1,139	-1,9763
1530		47,2	25,1039352	22,1	3,10	1,119	-1,9763
1540		46,9	25,0310097	21,9	3,09	1,099	-1,9859
1550		46,6	25,3956413	21,2	3,05	1,079	-1,9750
1560		46,3	24,9580841	21,3	3,06	1,059	-2,0014
1570		46	25,2497883	20,8	3,03	1,039	-1,9932
1580		45,8	25,0310097	20,8	3,03	1,019	-2,0140
1590		45,5	24,9580841	20,5	3,02	0,999	-2,0230

Dados relativos ao arrefecimento da água:

Tempo (s)	Time	Temperature 1	Temperature 2
	Time	Temp1	Temp2
	min	-C	-C
0,0	0,0000000	98,61359406	24,59345245
10,0	0,1666667	97,66555023	24,52052498
20,0	0,3333333	96,93628693	24,52052498
30,0	0,5000000	96,13410187	24,52052498
40,0	0,6666666	95,47776794	24,52052498

50,0	0,8333333	94,38387299	24,52052498
60,0	0,9999999	93,94631195	24,59345245
70,0	1,1666666	93,28997803	24,52052498
80,0	1,3333333	92,77949524	24,44759941
90,0	1,5000000	92,05023193	23,42663193
100,0	1,6666666	91,6126709	23,71833801
110,0	1,8333333	90,59170532	24,59345245
120,0	1,9999999	90,08122253	24,59345245
130,0	2,1666665	89,49781036	24,52052498
140,0	2,3333333	88,98732758	24,7393055
150,0	2,4999998	88,40391541	24,66637802
160,0	2,6666665	87,82051086	24,52052498
170,0	2,8333333	87,23709869	24,66637802
180,0	3,0000000	86,65368652	24,66637802
190,0	3,1666665	86,07028198	24,66637802
200,0	3,3333333	85,70565033	24,7393055
210,0	3,5000000	84,97638702	24,7393055
220,0	3,6666665	83,2990799	24,66637802
230,0	3,8333333	84,0283432	24,7393055
240,0	3,9999998	83,44493103	24,66637802
250,0	4,1666665	83,08029938	24,66637802
260,0	4,3333330	82,49689484	24,66637802
270,0	4,4999995	81,03836823	25,68734551
280,0	4,6666665	81,54885101	24,66637802
290,0	4,8333330	80,96543884	24,7393055
300,0	4,9999995	80,52788544	24,7393055
310,0	5,1666665	80,0903244	24,59345245
320,0	5,3333330	79,72569275	24,7393055
330,0	5,5000000	79,14228821	24,52052498
340,0	5,6666665	78,4130249	24,81223106
350,0	5,8333330	78,19424439	24,7393055
360,0	6,0000000	77,75668335	24,7393055
370,0	6,1666665	77,31912994	24,66637802
380,0	6,3333330	76,88156891	24,44759941
390,0	6,5000000	76,66279602	24,88515663
400,0	6,6666665	76,00645447	24,7393055
410,0	6,8333330	75,64182282	24,88515663
420,0	7,0000000	75,20426941	24,81223106
430,0	7,1666665	74,83963776	24,7393055
440,0	7,3333330	73,96452332	24,44759941
450,0	7,5000000	73,96452332	24,7393055
460,0	7,6666665	73,45404053	24,7393055
470,0	7,8333330	73,01647949	24,66637802
480,0	7,9999995	72,72477722	24,7393055

490,0	8,1666660	72,28721619	24,66637802
500,0	8,3333330	71,92258453	24,66637802
510,0	8,4999990	71,63088226	24,7393055
520,0	8,6666660	71,19332123	24,44759941
530,0	8,8333330	70,82868958	24,81223106
540,0	8,9999990	70,46406555	24,66637802
550,0	9,1666660	70,0994339	24,7393055
560,0	9,3333330	69,66187286	24,7393055
570,0	9,4999990	69,37017059	24,7393055
580,0	9,6666660	68,64090729	24,81223106
590,0	9,8333330	68,64090729	24,95808411
600,0	9,9999990	68,34919739	24,81223106
610,0	10,1666660	67,98457336	24,7393055
620,0	10,3333330	67,61994171	24,7393055
630,0	10,5000000	67,25531006	24,66637802
640,0	10,6666660	66,96360016	24,7393055
650,0	10,8333330	66,59896851	24,7393055
660,0	11,0000000	66,23433685	24,7393055
670,0	11,1666660	65,94263458	25,24978828
680,0	11,3333330	65,65093231	24,52052498
690,0	11,5000000	65,14044952	24,66637802
700,0	11,6666660	65,14044952	24,7393055
710,0	11,8333330	64,70288849	24,81223106
720,0	12,0000000	64,55703735	24,7393055
730,0	12,1666660	64,1924057	24,81223106
740,0	12,3333330	63,90069962	24,81223106
750,0	12,5000000	63,60899353	24,81223106
760,0	12,6666660	63,24436188	25,61441994
770,0	12,8333330	62,87973404	24,52052498
780,0	13,0000000	62,51510239	25,17686272
790,0	13,1666660	62,36924744	24,66637802
800,0	13,3333330	62,15047073	24,7393055
810,0	13,5000000	61,71291351	24,7393055
820,0	13,6666660	61,494133	24,66637802
830,0	13,8333330	61,12950134	24,66637802
840,0	14,0000000	60,91072464	24,66637802
850,0	14,1666660	60,69194412	24,59345245
860,0	14,3333330	60,40023804	24,59345245
870,0	14,5000000	60,18146133	24,66637802
880,0	14,6666660	59,81682968	24,37467384
890,0	14,8333330	59,59805298	24,66637802
900,0	15,0000000	58,94171524	24,66637802
910,0	15,1666660	59,01464081	24,7393055
920,0	15,3333330	58,86878967	24,66637802
930,0	15,5000000	58,72293472	24,95808411

940,0	15,6666660	58,21245194	24,66637802
950,0	15,8333330	58,0666008	24,7393055
960,0	15,9999990	58,86878967	24,66637802
970,0	16,1666660	58,43123245	25,54149246
980,0	16,3333321	57,33733749	24,7393055
990,0	16,4999981	57,19148636	24,66637802
1000,0	16,6666660	56,82685471	24,7393055
1010,0	16,8333321	56,60807419	24,81223106
1020,0	16,9999981	56,38929749	24,7393055
1030,0	17,1666660	56,24344254	24,66637802
1040,0	17,3333321	55,95174027	24,7393055
1050,0	17,4999981	55,66003418	24,7393055
1060,0	17,6666660	55,51418304	24,7393055
1070,0	17,8333321	55,07662201	25,39564133
1080,0	17,9999981	55,00369644	24,7393055
1090,0	18,1666660	54,71199417	24,7393055
1100,0	18,3333321	54,56613922	24,81223106
1110,0	18,4999981	54,63906479	24,7393055
1120,0	18,6666660	54,128582	24,81223106
1130,0	18,8333321	53,83687592	24,44759941
1140,0	18,9999981	53,69102478	24,88515663
1150,0	19,1666660	53,47224808	25,54149246
1160,0	19,3333321	53,32639313	24,81223106
1170,0	19,4999981	53,18054199	24,7393055
1180,0	19,6666660	52,81591034	24,81223106
1190,0	19,8333321	52,6700592	24,66637802
1200,0	19,9999981	52,52420425	24,7393055
1210,0	20,1666660	52,30542755	24,7393055
1220,0	20,3333321	52,08664703	24,81223106
1230,0	20,4999981	50,91982651	23,86418915
1240,0	20,6666660	51,64908981	24,66637802
1250,0	20,8333321	51,50323868	24,81223106
1260,0	21,0000000	52,45127869	24,7393055
1270,0	21,1666660	51,13860703	24,7393055
1280,0	21,3333321	50,99275208	25,39564133
1290,0	21,5000000	51,21153259	24,52052498
1300,0	21,6666660	50,48226929	24,88515663
1310,0	21,8333321	50,40934372	24,7393055
1320,0	22,0000000	50,19056702	24,66637802
1330,0	22,1666660	50,04471207	24,66637802
1340,0	22,3333321	49,9717865	24,66637802
1350,0	22,5000000	49,68008041	24,66637802
1360,0	22,6666660	49,46130371	24,81223106
1370,0	22,8333321	49,09667206	25,10393524
1380,0	23,0000000	49,31544876	24,7393055

1390,0	23,1666660	49,02374649	24,7393055
1400,0	23,3333321	49,24252319	24,7393055
1410,0	23,5000000	48,73204041	24,81223106
1420,0	23,6666660	48,58618927	24,7393055
1430,0	23,8333321	48,29448319	24,66637802
1440,0	24,0000000	48,22155762	24,66637802
1450,0	24,1666660	48,0027771	24,7393055
1460,0	24,3333321	47,85692596	24,7393055
1470,0	24,5000000	47,71107101	24,59345245
1480,0	24,6666660	47,56521988	24,52052498
1490,0	24,8333321	47,56521988	24,66637802
1500,0	25,0000000	47,34644318	24,7393055
1510,0	25,1666660	47,12766266	24,7393055
1520,0	25,3333321	46,76303101	24,66637802
1530,0	25,5000000	46,69010544	24,95808411
1540,0	25,6666660	46,47132492	24,59345245
1550,0	25,8333321	46,39839935	24,37467384
1560,0	26,0000000	46,25254822	24,7393055
1570,0	26,1666660	46,0337677	24,7393055
1580,0	26,3333321	45,88791657	24,66637802
1590,0	26,5000000	45,66913605	24,81223106
1600,0	26,6666660	45,59621048	24,81223106
1610,0	26,8333321	45,45035934	24,81223106
1620,0	27,0000000	45,30450821	24,88515663
1630,0	27,1666660	45,23157883	24,81223106
1640,0	27,3333321	45,08572769	24,81223106
1650,0	27,5000000	44,72109604	24,88515663
1660,0	27,6666660	44,21061325	24,81223106
1670,0	27,8333321	44,72109604	24,52052498
1680,0	28,0000000	44,35646439	24,95808411
1690,0	28,1666660	44,35646439	24,44759941
1700,0	28,3333321	44,21061325	25,83319855
1710,0	28,5000000	43,99183273	24,66637802
1720,0	28,6666660	43,8459816	24,7393055
1730,0	28,8333321	43,70013046	24,88515663
1740,0	29,0000000	43,62720108	24,88515663
1750,0	29,1666660	43,48134995	24,81223106
1760,0	29,3333321	43,18964386	24,81223106
1770,0	29,5000000	41,6581955	24,81223106
1780,0	29,6666660	43,04379273	24,7393055
1790,0	29,8333321	42,89794159	25,03100967
1800,0	30,0000000	42,6062355	24,01004219
1810,0	30,1666660	42,75208664	25,03100967
1820,0	30,3333321	42,6062355	24,08296776
1830,0	30,5000000	42,46038437	24,81223106

1840,0	30,6666660	42,38745499	24,7393055
1850,0	30,8333321	42,24160385	24,66637802
1860,0	31,0000000	42,09575272	24,66637802
1870,0	31,1666660	42,24160385	24,7393055
1880,0	31,3333321	42,67916107	24,7393055
1890,0	31,5000000	41,80404663	24,7393055
1900,0	31,6666660	41,6581955	25,24978828
1910,0	31,8333321	41,58526611	24,7393055
1920,0	31,9999981	41,43941498	24,7393055
1930,0	32,1666641	41,73112106	24,7393055
1940,0	32,3333321	41,14770889	24,66637802
1950,0	32,4999962	41,14770889	24,7393055
1960,0	32,6666641	41,00185776	23,86418915
1970,0	32,8333321	41,00185776	25,17686272
1980,0	32,9999962	40,85600662	24,95808411
1990,0	33,1666641	40,71015167	24,81223106
2000,0	33,3333321	40,56430054	24,81223106
2010,0	33,4999962	40,49137497	24,81223106
2020,0	33,6666641	40,34552002	24,81223106
2030,0	33,8333321	40,27259445	24,88515663
2040,0	33,9999962	40,12674332	24,81223106
2050,0	34,1666641	39,98089218	24,81223106
2060,0	34,3333321	39,98089218	24,44759941
2070,0	34,4999962	39,76211166	24,95808411
2080,0	34,6666641	39,6891861	24,88515663
2090,0	34,8333321	39,61626053	24,7393055
2100,0	34,9999962	39,32455444	24,81223106
2110,0	35,1666641	39,39748001	24,81223106
2120,0	35,3333321	39,32455444	24,81223106
2130,0	35,4999962	39,25162888	24,81223106
2140,0	35,6666641	39,10577393	24,81223106
2150,0	35,8333321	39,03284836	25,24978828
2160,0	35,9999962	38,95992279	24,7393055
2170,0	36,1666641	39,03284836	24,88515663
2180,0	36,3333321	38,81407166	24,08296776
2190,0	36,4999962	38,66821671	24,66637802
2200,0	36,6666641	38,59529114	24,66637802
2210,0	36,8333321	38,44944	24,81223106
2220,0	36,9999962	38,44944	24,7393055
2230,0	37,1666641	38,81407166	25,32271385
2240,0	37,3333321	38,23065949	24,81223106
2250,0	37,4999962	38,15773392	24,52052498
2260,0	37,6666641	38,66821671	25,24978828
2270,0	37,8333321	37,79310226	24,81223106
2280,0	37,9999962	37,79310226	24,81223106

2290,0	38,1666641	37,64725113	24,81223106
2300,0	38,3333321	37,64725113	24,88515663
2310,0	38,4999962	37,64725113	24,81223106
2320,0	38,6666641	37,50139618	24,7393055
2330,0	38,8333321	37,42847061	24,88515663
2340,0	38,9999962	37,57432556	24,95808411
2350,0	39,1666641	37,28261948	25,4685669
2360,0	39,3333321	37,06383896	24,81223106
2370,0	39,4999962	37,28261948	24,81223106
2380,0	39,6666641	37,06383896	24,7393055
2390,0	39,8333321	36,99091339	24,37467384
2400,0	39,9999962	36,84506226	24,81223106
2410,0	40,1666641	36,77213669	24,81223106
2420,0	40,3333321	36,69921112	24,59345245
2430,0	40,4999962	36,55335617	25,03100967
2440,0	40,6666641	36,69921112	24,81223106
2450,0	40,8333321	36,4804306	24,81223106
2460,0	40,9999962	36,55335617	24,95808411
2470,0	41,1666641	36,26165009	24,81223106
2480,0	41,3333321	36,26165009	24,81223106
2490,0	41,5000000	36,11579895	24,81223106
2500,0	41,6666641	36,04287338	24,7393055
2510,0	41,8333321	35,89702225	24,81223106
2520,0	42,0000000	35,96994782	24,7393055
2530,0	42,1666641	35,7511673	24,7393055
2540,0	42,3333321	35,7511673	24,88515663
2550,0	42,5000000	35,09483337	24,81223106
2560,0	42,6666641	35,67824173	24,88515663
2570,0	42,8333321	35,60531616	24,88515663
2580,0	43,0000000	35,45946121	24,88515663
2590,0	43,1666641	35,38653565	24,88515663
2600,0	43,3333321	35,31361008	24,88515663
2610,0	43,5000000	35,24068451	24,88515663
2620,0	43,6666641	35,16775894	24,88515663
2630,0	43,8333321	35,09483337	24,95808411
2640,0	44,0000000	34,94897842	24,95808411
2650,0	44,1666641	34,94897842	24,88515663
2660,0	44,3333321	34,87605286	24,95808411
2670,0	44,5000000	34,87605286	24,95808411
2680,0	44,6666641	34,80312729	24,66637802
2690,0	44,8333321	34,65727615	24,95808411
2700,0	45,0000000	34,58434677	24,95808411
2710,0	45,1666641	34,58434677	24,95808411
2720,0	45,3333321	34,43849564	24,95808411
2730,0	45,5000000	34,43849564	25,03100967

2740,0	45,6666641	34,2926445	24,95808411
2750,0	45,8333321	34,43849564	24,95808411
2760,0	46,0000000	34,14678955	25,39564133
2770,0	46,1666641	34,07386398	25,03100967
2780,0	46,3333321	34,36557007	25,03100967
2790,0	46,5000000	34,00093842	24,95808411
2800,0	46,6666641	34,07386398	24,95808411
2810,0	46,8333321	33,92801285	25,10393524
2820,0	47,0000000	34,07386398	24,95808411
2830,0	47,1666641	33,70923233	25,10393524
2840,0	47,3333321	33,7821579	25,32271385
2850,0	47,5000000	33,92801285	24,88515663
2860,0	47,6666641	33,12582398	24,66637802
2870,0	47,8333321	33,49045563	24,95808411
2880,0	48,0000000	33,5633812	25,03100967
2890,0	48,1666641	33,63630676	25,24978828
2900,0	48,3333321	33,41752625	24,88515663
2910,0	48,5000000	33,34460068	25,03100967
2920,0	48,6666641	32,90704346	24,95808411
2930,0	48,8333321	33,27167511	25,10393524
2940,0	49,0000000	33,19874954	24,95808411
2950,0	49,1666641	33,12582398	24,95808411
2960,0	49,3333321	33,05289841	25,10393524
2970,0	49,5000000	32,97996903	24,88515663
2980,0	49,6666641	32,90704346	25,03100967
2990,0	49,8333321	33,05289841	25,32271385
3000,0	50,0000000	32,76119232	25,17686272
3010,0	50,1666641	33,41752625	25,03100967
3020,0	50,3333321	32,76119232	25,17686272
3030,0	50,5000000	32,5424118	25,03100967
3040,0	50,6666641	32,68826675	24,95808411
3050,0	50,8333321	32,61534119	25,10393524
3060,0	51,0000000	32,5424118	24,88515663
3070,0	51,1666641	32,46948624	24,95808411
3080,0	51,3333321	32,39656067	24,95808411
3090,0	51,5000000	32,3236351	25,03100967
3100,0	51,6666641	32,39656067	24,95808411
3110,0	51,8333321	32,25070953	25,10393524
3120,0	52,0000000	32,3236351	25,03100967
3130,0	52,1666641	32,17778015	25,10393524
3140,0	52,3333321	32,46948624	24,95808411
3150,0	52,5000000	31,66729736	24,95808411
3160,0	52,6666641	32,10485458	25,03100967
3170,0	52,8333321	31,95900345	25,10393524
3180,0	53,0000000	31,95900345	25,10393524

3190,0	53,1666641	32,46948624	25,03100967
3200,0	53,3333321	31,74022484	25,24978828
3210,0	53,5000000	31,44851875	24,37467384
3220,0	53,6666641	31,74022484	25,03100967
3230,0	53,8333321	31,37559319	25,68734551
3240,0	54,0000000	31,74022484	25,03100967
3250,0	54,1666641	31,5943718	24,95808411
3260,0	54,3333321	31,52144623	24,95808411
3270,0	54,5000000	31,5943718	25,61441994
3280,0	54,6666641	31,30266762	25,03100967
3290,0	54,8333321	31,44851875	25,10393524
3300,0	55,0000000	31,01096153	25,03100967
3310,0	55,1666641	31,22974014	24,95808411
3320,0	55,3333321	31,30266762	24,95808411
3330,0	55,5000000	30,64632988	25,10393524
3340,0	55,6666641	31,22974014	25,03100967
3350,0	55,8333321	31,08388901	25,10393524
3360,0	56,0000000	30,64632988	25,39564133
3370,0	56,1666641	31,30266762	25,03100967
3380,0	56,3333321	31,08388901	25,10393524
3390,0	56,5000000	31,01096153	25,03100967
3400,0	56,6666641	32,03192902	24,66637802
3410,0	56,8333321	30,93803597	24,88515663
3420,0	57,0000000	30,86510849	24,59345245
3430,0	57,1666641	31,08388901	24,88515663
3440,0	57,3333321	31,08388901	25,03100967
3450,0	57,5000000	30,71925736	24,95808411
3460,0	57,6666641	30,71925736	25,03100967
3470,0	57,8333321	30,64632988	24,88515663
3480,0	58,0000000	30,57340431	24,95808411
3490,0	58,1666641	30,50047875	24,95808411
3500,0	58,3333321	30,50047875	25,10393524
3510,0	58,5000000	30,79218292	25,03100967
3520,0	58,6666641	30,57340431	24,95808411
3530,0	58,8333321	30,42755127	25,03100967
3540,0	59,0000000	29,55243683	24,95808411
3550,0	59,1666641	30,3546257	25,10393524
3560,0	59,3333321	30,28170013	25,03100967
3570,0	59,5000000	30,3546257	24,95808411
3580,0	59,6666641	30,42755127	24,52052498
3590,0	59,8333321	30,20877266	24,95808411
3600,0	60,0000000	30,93803597	25,10393524
3610,0	60,1666641	29,98999405	25,03100967
3620,0	60,3333321	30,13584709	25,03100967
3630,0	60,5000000	30,28170013	24,95808411

3640,0	60,6666641	29,91706848	25,03100967
3650,0	60,8333321	29,98999405	25,03100967
3660,0	61,0000000	29,98999405	24,95808411
3670,0	61,1666641	29,91706848	25,03100967
3680,0	61,3333321	29,98999405	25,03100967
3690,0	61,5000000	29,98999405	25,39564133
3700,0	61,6666641	29,84414291	24,95808411
3710,0	61,8333321	29,84414291	24,95808411
3720,0	62,0000000	29,69828987	25,10393524
3730,0	62,1666641	29,77121544	24,95808411
3740,0	62,3333321	29,69828987	25,03100967
3750,0	62,5000000	29,84414291	25,03100967
3760,0	62,6666641	29,6253624	24,7393055
3770,0	62,8333321	29,55243683	25,03100967
3780,0	63,0000000	29,84414291	24,2288208
3790,0	63,1666641	29,55243683	24,95808411
3800,0	63,3333321	29,47951126	24,95808411
3810,0	63,5000000	29,47951126	25,03100967
3820,0	63,6666641	29,69828987	24,95808411
3830,0	63,8333321	29,40658379	25,03100967
3840,0	63,9999962	29,6253624	24,88515663
3850,0	64,1666641	28,82317543	24,95808411
3860,0	64,3333282	29,33365822	25,10393524
3870,0	64,4999924	29,26073265	25,17686272
3880,0	64,6666641	28,75024796	25,17686272
3890,0	64,8333282	29,18780518	25,10393524
3900,0	64,9999924	28,31269074	25,10393524
3910,0	65,1666641	29,04195404	25,03100967
3920,0	65,3333282	29,18780518	25,03100967
3930,0	65,4999924	29,18780518	25,10393524
3940,0	65,6666641	29,04195404	25,10393524
3950,0	65,8333282	29,11487961	24,88515663
3960,0	65,9999924	29,33365822	25,10393524
3970,0	66,1666641	29,04195404	25,10393524
3980,0	66,3333282	28,75024796	24,95808411
3990,0	66,4999924	29,11487961	25,10393524
4000,0	66,6666641	28,896101	25,17686272
4010,0	66,8333282	28,896101	25,10393524
4020,0	66,9999924	28,896101	25,17686272
4030,0	67,1666641	28,896101	25,03100967
4040,0	67,3333282	28,82317543	25,10393524
4050,0	67,4999924	28,75024796	25,10393524
4060,0	67,6666641	28,896101	25,17686272
4070,0	67,8333282	28,67732239	25,03100967
4080,0	67,9999924	28,67732239	25,10393524

4090,0	68,1666641	28,896101	25,10393524
4100,0	68,3333282	28,75024796	25,03100967
4110,0	68,4999924	28,67732239	25,03100967
4120,0	68,6666641	28,67732239	25,03100967
4130,0	68,8333282	28,75024796	25,17686272
4140,0	68,9999924	29,04195404	25,24978828
4150,0	69,1666641	28,67732239	25,24978828
4160,0	69,3333282	27,72928047	24,81223106
4170,0	69,4999924	28,45854378	25,03100967
4180,0	69,6666641	28,3856163	24,95808411
4190,0	69,8333282	28,45854378	25,10393524
4200,0	69,9999924	28,45854378	24,88515663
4210,0	70,1666641	28,3856163	25,03100967
4220,0	70,3333282	28,3856163	25,03100967
4230,0	70,4999924	28,45854378	25,03100967
4240,0	70,6666641	28,31269074	25,03100967
4250,0	70,8333282	28,23976517	25,10393524
4260,0	70,9999924	28,3856163	25,17686272
4270,0	71,1666641	28,23976517	25,10393524
4280,0	71,3333282	28,31269074	25,03100967
4290,0	71,4999924	28,16683769	24,2288208
4300,0	71,6666641	28,02098656	24,81223106
4310,0	71,8333282	27,80220795	24,08296776
4320,0	71,9999924	28,09391213	24,95808411
4330,0	72,1666641	28,16683769	25,03100967
4340,0	72,3333282	28,09391213	24,95808411
4350,0	72,4999924	28,02098656	24,95808411
4360,0	72,6666641	28,53146935	25,10393524
4370,0	72,8333282	28,02098656	25,10393524
4380,0	72,9999924	28,02098656	25,17686272
4390,0	73,1666641	28,02098656	25,10393524
4400,0	73,3333282	27,94805908	25,03100967
4410,0	73,4999924	28,3856163	24,7393055
4420,0	73,6666641	27,87513351	25,03100967
4430,0	73,8333282	27,94805908	25,10393524
4440,0	73,9999924	28,53146935	24,52052498
4450,0	74,1666641	27,87513351	25,10393524
4460,0	74,3333282	27,80220795	25,03100967
4470,0	74,4999924	27,80220795	25,10393524
4480,0	74,6666641	27,80220795	25,17686272
4490,0	74,8333282	27,6563549	25,10393524
4500,0	74,9999924	28,45854378	25,17686272
4510,0	75,1666641	27,6563549	25,03100967
4520,0	75,3333282	27,72928047	24,95808411
4530,0	75,4999924	27,6563549	25,10393524

4540,0	75,6666641	27,6563549	25,10393524
4550,0	75,8333282	27,43757629	25,03100967
4560,0	75,9999924	27,58342743	25,61441994
4570,0	76,1666641	27,6563549	25,03100967
4580,0	76,3333282	27,94805908	25,03100967
4590,0	76,4999924	27,51050186	24,7393055
4600,0	76,6666641	27,51050186	25,03100967
4610,0	76,8333282	27,58342743	25,68734551
4620,0	76,9999924	27,43757629	25,10393524
4630,0	77,1666641	27,43757629	25,03100967
4640,0	77,3333282	27,43757629	25,03100967
4650,0	77,4999924	27,43757629	25,17686272
4660,0	77,6666641	27,72928047	25,39564133
4670,0	77,8333282	27,43757629	25,03100967
4680,0	77,9999924	27,00001907	24,95808411
4690,0	78,1666641	27,21879768	25,17686272
4700,0	78,3333282	27,36464882	25,03100967
4710,0	78,4999924	27,36464882	25,03100967
4720,0	78,6666641	27,14587021	25,83319855
4730,0	78,8333282	27,43757629	25,10393524
4740,0	78,9999924	27,29172325	24,88515663
4750,0	79,1666641	27,29172325	25,03100967
4760,0	79,3333282	27,21879768	25,03100967
4770,0	79,4999924	27,21879768	25,76027298
4780,0	79,6666641	27,14587021	24,95808411
4790,0	79,8333282	27,07294464	25,10393524
4800,0	79,9999924	27,43757629	25,03100967
4810,0	80,1666641	27,14587021	25,39564133
4820,0	80,3333282	27,00001907	24,95808411
4830,0	80,4999924	27,21879768	25,24978828
4840,0	80,6666641	27,07294464	25,03100967
4850,0	80,8333282	27,07294464	24,95808411

T1 - T2	ln(T1-T2)	Ajuste Linear 1	Resíduos	Ajuste Linear 2	Resíduos
74,02014	4,30433724	4,2E+00	-0,09411	4,164881481	-0,13946
73,14503	4,292444118	4,2E+00	-0,0894	4,157859975	-0,13458
72,41576	4,282423982	4,2E+00	-0,08655	4,150838469	-0,13159
71,61358	4,271284677	4,2E+00	-0,08259	4,143816963	-0,12747
70,95724	4,262077484	4,2E+00	-0,08056	4,136795458	-0,12528
69,86335	4,246541163	4,2E+00	-0,07221	4,129773951	-0,11677

69,35286	4,239207379	4,2E+00	-0,07205	4,122752446	-0,11645
68,76945	4,23075965	4,2E+00	-0,07078	4,115730939	-0,11503
68,3319	4,224376654	4,2E+00	-0,07158	4,108709434	-0,11567
68,6236	4,228636499	4,1E+00	-0,08302	4,101687925	-0,12695
67,89433	4,217952568	4,1E+00	-0,07951	4,09466642	-0,12329
65,99825	4,18962827	4,1E+00	-0,05836	4,087644916	-0,10198
65,48777	4,181863409	4,1E+00	-0,05778	4,080623411	-0,10124
64,97729	4,174037753	4,1E+00	-0,05713	4,073601906	-0,10044
64,24802	4,162750939	4,1E+00	-0,05302	4,066580397	-0,09617
63,73754	4,154773673	4,1E+00	-0,05222	4,059558897	-0,09521
63,29999	4,147885106	4,1E+00	-0,05251	4,052537388	-0,09535
62,57072	4,136297448	4,1E+00	-0,0481	4,045515878	-0,09078
61,98731	4,126929663	4,1E+00	-0,04592	4,038494368	-0,08844
61,4039	4,117473416	4,1E+00	-0,04364	4,031472869	-0,086
60,96634	4,110321988	4,1E+00	-0,04366	4,024451359	-0,08587
60,23708	4,098288135	4,1E+00	-0,03881	4,01742985	-0,08086
58,6327	4,071292593	4,1E+00	-0,01899	4,01040835	-0,06088
59,28904	4,082424427	4,0E+00	-0,0373	4,00338684	-0,07904
58,77855	4,073777044	4,0E+00	-0,03583	3,996365341	-0,07741
58,41392	4,067554241	4,0E+00	-0,03679	3,989343831	-0,07821
57,83052	4,057516609	4,0E+00	-0,03393	3,982322332	-0,07519
55,35102	4,013695136	4,0E+00	0,002713	3,975300832	-0,03839
56,88247	4,040987262	4,0E+00	-0,03176	3,968279312	-0,07271
56,22613	4,029381655	4,0E+00	-0,02733	3,961257813	-0,06812
55,78858	4,021569188	4,0E+00	-0,0267	3,954236313	-0,06733
55,49687	4,016326658	4,0E+00	-0,02863	3,947214794	-0,06911
54,98639	4,00708565	4,0E+00	-0,02657	3,940193294	-0,06689
54,62176	4,000432397	4,0E+00	-0,0271	3,933171774	-0,06726
53,60079	3,981563878	4,0E+00	-0,01541	3,926150275	-0,05541
53,45494	3,978839035	4,0E+00	-0,01986	3,919128775	-0,05971
53,01738	3,970619744	4,0E+00	-0,01882	3,912107256	-0,05851
52,65275	3,963718505	3,9E+00	-0,0191	3,905085756	-0,05863
52,43397	3,959554654	3,9E+00	-0,02211	3,898064257	-0,06149
51,77764	3,946958384	3,9E+00	-0,01669	3,891042737	-0,05592
51,26715	3,937050176	3,9E+00	-0,01396	3,884021237	-0,05303
50,75667	3,927042963	3,9E+00	-0,01113	3,876999738	-0,05004
50,39204	3,919833193	3,9E+00	-0,0111	3,869978218	-0,04985
50,10033	3,91402764	3,9E+00	-0,01248	3,862956719	-0,05107
49,51692	3,902314508	3,9E+00	-0,00794	3,855935219	-0,04638
49,22522	3,896406049	3,9E+00	-0,00921	3,848913699	-0,04749
48,71474	3,885981552	3,9E+00	-0,00596	3,8418922	-0,04409
48,3501	3,878468321	3,9E+00	-0,00563	3,8348707	-0,0436
47,98547	3,870898293	3,9E+00	-0,00524	3,827849201	-0,04305
47,62084	3,863270442	3,9E+00	-0,00479	3,820827701	-0,04244

47,25621	3,855584	3,9E+00	-0,00428	3,813806181	-0,04178
46,89158	3,847838059	3,8E+00	-0,00371	3,806784702	-0,04105
46,74572	3,84472274	3,8E+00	-0,00778	3,799763182	-0,04496
46,01646	3,828999126	3,8E+00	0,000768	3,792741663	-0,03626
45,79769	3,824233599	3,8E+00	-0,00164	3,785720183	-0,03851
45,36013	3,81463349	3,8E+00	0,000777	3,778698664	-0,03593
44,92257	3,804940282	3,8E+00	0,003292	3,771677144	-0,03326
44,63087	3,798425662	3,8E+00	0,002628	3,764655664	-0,03377
43,82868	3,780288311	3,8E+00	0,013587	3,757634145	-0,02265
43,68282	3,776954963	3,8E+00	0,009742	3,750612625	-0,02634
43,53697	3,773610378	3,8E+00	0,005908	3,743591146	-0,03002
43,24527	3,766887814	3,8E+00	0,005452	3,736569626	-0,03032
42,88064	3,758420354	3,8E+00	0,006741	3,729548106	-0,02887
42,58893	3,751594408	3,8E+00	0,006388	3,722526587	-0,02907
42,22429	3,742995758	3,8E+00	0,007809	3,715505107	-0,02749
41,85966	3,734322667	3,7E+00	0,009303	3,708483588	-0,02584
41,49503	3,725573694	3,7E+00	0,010874	3,701462068	-0,02411
40,69285	3,70605231	3,7E+00	0,023217	3,694440588	-0,01161
41,13041	3,716747686	3,7E+00	0,005343	3,687419069	-0,02933
40,47407	3,700661559	3,7E+00	0,01425	3,680397549	-0,02026
40,40114	3,698858102	3,7E+00	0,008876	3,67337607	-0,02548
39,89066	3,686142147	3,7E+00	0,014413	3,66635455	-0,01979
39,81773	3,684312337	3,7E+00	0,009064	3,65933303	-0,02498
39,38017	3,673262508	3,7E+00	0,012936	3,652311551	-0,02095
39,08847	3,665827502	3,7E+00	0,013192	3,645290031	-0,02054
38,79676	3,658336802	3,7E+00	0,013504	3,638268512	-0,02007
37,62994	3,627800062	3,7E+00	0,036863	3,631247032	0,003447
38,35921	3,646994631	3,7E+00	0,01049	3,624225512	-0,02277
37,33824	3,620017994	3,7E+00	0,030288	3,617203993	-0,00281
37,70287	3,629736203	3,6E+00	0,013391	3,610182513	-0,01955
37,41117	3,621969196	3,6E+00	0,01398	3,603160994	-0,01881
36,97361	3,610204361	3,6E+00	0,018566	3,596139474	-0,01406
36,82775	3,606251772	3,6E+00	0,01534	3,589117995	-0,01713
36,46312	3,59630143	3,6E+00	0,018112	3,582096475	-0,0142
36,24435	3,590283414	3,6E+00	0,016952	3,575074955	-0,01521
36,09849	3,586251082	3,6E+00	0,013805	3,568053476	-0,0182
35,80679	3,578137417	3,6E+00	0,014741	3,561031956	-0,01711
35,51508	3,569957488	3,6E+00	0,015742	3,554010436	-0,01595
35,44216	3,567901955	3,6E+00	0,010619	3,546988957	-0,02091
34,93167	3,55339401	3,6E+00	0,017949	3,539967437	-0,01343
34,27534	3,534426064	3,6E+00	0,029738	3,532945918	-0,00148
34,27534	3,534426008	3,6E+00	0,02256	3,525924438	-0,0085
34,20241	3,532296158	3,5E+00	0,017511	3,518902919	-0,01339
33,76485	3,519420339	3,5E+00	0,023208	3,511881399	-0,00754
33,54607	3,512919835	3,5E+00	0,02253	3,504859919	-0,00806

33,3273	3,50637674	3,5E+00	0,021895	3,4978384	-0,00854
34,20241	3,532296158	3,5E+00	-0,0112	3,49081692	-0,04148
32,88974	3,493160755	3,5E+00	0,020754	3,483795401	-0,00937
32,59803	3,484251918	3,5E+00	0,022485	3,476773921	-0,00748
32,52511	3,482012355	3,5E+00	0,017546	3,469752442	-0,01226
32,08755	3,46846808	3,5E+00	0,023911	3,462730882	-0,00574
31,79584	3,459335562	3,5E+00	0,025865	3,455709402	-0,00363
31,64999	3,454737895	3,5E+00	0,023285	3,448687923	-0,00605
31,57706	3,452431051	3,5E+00	0,018413	3,441666363	-0,01076
31,21243	3,440816566	3,5E+00	0,022849	3,434644884	-0,00617
30,92073	3,43142679	3,5E+00	0,02506	3,427623404	-0,0038
30,77488	3,426698693	3,4E+00	0,02261	3,420601844	-0,0061
29,68098	3,39050646	3,4E+00	0,051624	3,413580365	0,023074
30,26439	3,409971805	3,4E+00	0,02498	3,406558885	-0,00341
29,97269	3,40028659	3,4E+00	0,027487	3,399537326	-0,00075
29,75391	3,39296049	3,4E+00	0,027634	3,392515846	-0,00044
29,89976	3,39785043	3,4E+00	0,015566	3,385494367	-0,01236
29,31635	3,378145413	3,4E+00	0,028092	3,378472807	0,000327
29,38928	3,380629863	3,4E+00	0,01843	3,371451327	-0,00918
28,80587	3,360579122	3,4E+00	0,031302	3,364429848	0,003851
27,93076	3,329728433	3,4E+00	0,054974	3,357408288	0,02768
28,51416	3,350400878	3,4E+00	0,027123	3,350386809	-1,4E-05
28,44124	3,347840081	3,4E+00	0,022505	3,343365329	-0,00447
28,00368	3,332335904	3,4E+00	0,030831	3,336343769	0,004008
28,00368	3,332335972	3,4E+00	0,023653	3,32932229	-0,00301
27,7849	3,324492663	3,3E+00	0,024317	3,32230081	-0,00219
27,56612	3,316587557	3,3E+00	0,025044	3,31527925	-0,00131
27,27442	3,305949119	3,3E+00	0,028504	3,308257771	0,002309
27,05564	3,297895389	3,3E+00	0,029379	3,301236292	0,003341
26,98271	3,295196357	3,3E+00	0,0249	3,294214732	-0,00098
26,69101	3,284326715	3,3E+00	0,028591	3,287193252	0,002867
27,71197	3,321864565	3,3E+00	-0,01613	3,280171692	-0,04169
26,3993	3,273337553	3,3E+00	0,025223	3,273150213	-0,00019
25,59711	3,242479484	3,3E+00	0,048903	3,266128733	0,023649
26,69101	3,284326715	3,3E+00	-0,00012	3,259107174	-0,02522
25,59711	3,242479558	3,3E+00	0,034546	3,252085694	0,009606
25,67004	3,245324484	3,3E+00	0,024522	3,245064215	-0,00026
25,52419	3,239626591	3,3E+00	0,023042	3,238042655	-0,00158
25,37833	3,23389582	3,3E+00	0,021594	3,231021175	-0,00287
25,30541	3,231018147	3,2E+00	0,017293	3,223999696	-0,00702
25,0137	3,21942377	3,2E+00	0,021709	3,216978136	-0,00245
24,64907	3,204739279	3,2E+00	0,029215	3,209956657	0,005217
23,99274	3,177751152	3,2E+00	0,049025	3,202935177	0,025184
24,57614	3,201776186	3,2E+00	0,017821	3,195913617	-0,00586
24,28444	3,189835857	3,2E+00	0,022583	3,188892138	-0,00094

24,50322	3,198804443	3,2E+00	0,006436	3,181870658	-0,01693
23,91981	3,174706958	3,2E+00	0,023355	3,174849099	0,000142
23,84688	3,171653549	3,2E+00	0,01923	3,167827619	-0,00383
23,62811	3,1624369	3,2E+00	0,021268	3,16080614	-0,00163
23,55518	3,159345737	3,2E+00	0,017181	3,15378458	-0,00556
23,26347	3,146884388	3,2E+00	0,022464	3,1467631	-0,00012
23,11762	3,140595118	3,2E+00	0,021575	3,139741621	-0,00085
23,11762	3,140595035	3,2E+00	0,014396	3,132720061	-0,00787
23,04469	3,137435587	3,1E+00	0,010377	3,125698581	-0,01174
22,89884	3,131086335	3,1E+00	0,009548	3,118677102	-0,01241
22,60714	3,118265683	3,1E+00	0,01519	3,111655542	-0,00661
22,38836	3,108541054	3,1E+00	0,017736	3,104634063	-0,00391
22,09665	3,095426148	3,1E+00	0,023673	3,097612583	0,002186
21,73202	3,07878681	3,1E+00	0,033134	3,090591023	0,011804
21,87787	3,085475736	3,1E+00	0,019266	3,083569544	-0,00191
22,02373	3,092120305	3,1E+00	0,005443	3,076548064	-0,01557
21,51324	3,068668686	3,1E+00	0,021716	3,069526505	0,000858
21,29446	3,058447048	3,1E+00	0,02476	3,062505025	0,004058
21,22154	3,055016635	3,1E+00	0,021012	3,055483546	0,000467
20,8569	3,037685068	3,1E+00	0,031165	3,048461986	0,010777
20,78398	3,03418247	3,1E+00	0,027489	3,041440506	0,007258
20,63813	3,027140252	3,1E+00	0,027353	3,034419027	0,007279
20,41935	3,016483058	3,0E+00	0,030831	3,027397467	0,010914
20,41935	3,016482871	3,0E+00	0,023653	3,020375988	0,003893
20,2735	3,009314448	3,0E+00	0,023643	3,013354508	0,00404
19,83594	2,987495414	3,0E+00	0,038283	3,006332948	0,018838
19,39838	2,96518967	3,0E+00	0,053411	2,999311469	0,034122
20,20057	3,005710874	3,0E+00	0,005711	2,992289989	-0,01342
19,39838	2,965189572	3,0E+00	0,039054	2,98526843	0,020079
19,90886	2,991165109	3,0E+00	0,0059	2,97824695	-0,01292
18,37741	2,911122449	3,0E+00	0,078764	2,971225471	0,060103
19,32545	2,961423124	3,0E+00	0,021285	2,964203911	0,002781
19,10668	2,950037808	3,0E+00	0,025492	2,957182431	0,007145
18,81497	2,934653033	3,0E+00	0,033698	2,950160952	0,015508
18,74204	2,930769366	3,0E+00	0,030403	2,943139392	0,01237
18,66912	2,926870762	3,0E+00	0,027123	2,936117913	0,009247
18,37741	2,911122345	2,9E+00	0,035693	2,929096433	0,017974
16,84596	2,824111129	2,9E+00	0,115526	2,922074873	0,097964
18,30449	2,907146234	2,9E+00	0,025313	2,915053394	0,007907
17,86693	2,882951625	2,9E+00	0,042329	2,908031914	0,02508
18,59619	2,922956899	2,9E+00	-0,00486	2,901010354	-0,02195
17,72108	2,87475472	2,9E+00	0,036169	2,893988875	0,019234
18,52327	2,919027658	2,9E+00	-0,01528	2,886967395	-0,03206
17,64815	2,870631149	2,9E+00	0,025935	2,879945836	0,009315
17,64815	2,870630933	2,9E+00	0,018757	2,872924356	0,002293

17,57523	2,866490287	2,9E+00	0,015719	2,865902877	-0,00059
17,42937	2,858156984	2,9E+00	0,016874	2,858881317	0,000724
17,5023	2,862332207	2,9E+00	0,00552	2,851859837	-0,01047
17,93986	2,887024806	2,9E+00	-0,02635	2,844838358	-0,04219
17,06474	2,837014413	2,9E+00	0,016481	2,837816798	0,000802
16,40841	2,797793838	2,8E+00	0,048523	2,830795319	0,033001
16,84596	2,824110902	2,8E+00	0,015028	2,823773839	-0,00034
16,70011	2,815415275	2,8E+00	0,016545	2,81675236	0,001337
16,99182	2,832731791	2,8E+00	-0,00795	2,80973088	-0,023
16,48133	2,802228278	2,8E+00	0,015375	2,80270932	0,000481
16,4084	2,797793606	2,8E+00	0,012631	2,795687921	-0,00211
17,13767	2,841278883	2,8E+00	-0,03803	2,788666361	-0,05261
15,825	2,761590655	2,8E+00	0,034477	2,781644802	0,020054
15,89792	2,766188441	2,8E+00	0,022701	2,774623403	0,008435
15,89792	2,766188321	2,8E+00	0,015523	2,767601843	0,001414
15,75207	2,756971752	2,8E+00	0,017561	2,760580283	0,003609
15,67914	2,752331416	2,8E+00	0,015023	2,753558884	0,001227
15,53329	2,742985396	2,8E+00	0,01719	2,746537324	0,003552
15,38744	2,733551451	2,8E+00	0,019446	2,739515764	0,005964
15,31451	2,728800892	2,7E+00	0,017018	2,732494365	0,003693
15,16866	2,719231531	2,7E+00	0,019409	2,725472805	0,006241
15,53329	2,742985641	2,7E+00	-0,01152	2,718451245	-0,02453
14,80403	2,694899276	2,7E+00	0,029384	2,711429846	0,016531
14,80403	2,694899405	2,7E+00	0,022205	2,704408286	0,009509
14,87696	2,699813374	2,7E+00	0,010113	2,697386726	-0,00243
14,51232	2,674998177	2,7E+00	0,02775	2,690365327	0,015367
14,58525	2,680010672	2,7E+00	0,015559	2,683343768	0,003333
14,51232	2,674998177	2,7E+00	0,013393	2,676322208	0,001324
14,4394	2,66996043	2,7E+00	0,011252	2,669300809	-0,00066
14,29354	2,659807887	2,7E+00	0,014226	2,662279249	0,002471
13,78306	2,623440307	2,7E+00	0,043415	2,655257689	0,031817
14,22062	2,654692834	2,7E+00	0,004984	2,64823629	-0,00646
14,14769	2,649551482	2,7E+00	0,002947	2,64121473	-0,00834
14,7311	2,68996117	2,6E+00	-0,04464	2,63419317	-0,05577
14,00184	2,639188656	2,6E+00	-0,00105	2,627171771	-0,01202
13,92891	2,63396676	2,6E+00	-0,003	2,620150211	-0,01382
13,63721	2,612802008	2,6E+00	0,010983	2,613128651	0,000327
13,71013	2,618135304	2,6E+00	-0,00153	2,606107252	-0,01203
13,49136	2,602049318	2,6E+00	0,007378	2,599085692	-0,00296
13,41843	2,596629017	2,6E+00	0,00562	2,592064133	-0,00456
13,63721	2,612802008	2,6E+00	-0,01773	2,585042734	-0,02776
13,41843	2,596629017	2,6E+00	-0,00874	2,578021174	-0,01861
12,98087	2,563476828	2,6E+00	0,017237	2,570999614	0,007523
12,98087	2,563476828	2,6E+00	0,010059	2,563978215	0,000501
12,83502	2,552177378	2,6E+00	0,014179	2,556956655	0,004779

12,76209	2,54647941	2,6E+00	0,012699	2,549935095	0,003456
12,83502	2,552177378	2,6E+00	-0,00018	2,542913696	-0,00926
12,76209	2,546479111	2,5E+00	-0,00166	2,535892136	-0,01059
12,54331	2,529187773	2,5E+00	0,008455	2,528870576	-0,00032
12,61624	2,534984988	2,5E+00	-0,00452	2,521849177	-0,01314
11,81405	2,46928972	2,5E+00	0,053996	2,514827617	0,045538
12,25161	2,505657185	2,5E+00	0,01045	2,507806058	0,002149
12,47039	2,523356907	2,5E+00	-0,01443	2,500784658	-0,02257
12,32453	2,511591866	2,5E+00	-0,00984	2,493763099	-0,01783
12,61624	2,534984837	2,5E+00	-0,04041	2,486741539	-0,04824
12,03283	2,487638847	2,5E+00	-0,00025	2,47972014	-0,00792
11,95991	2,481559858	2,5E+00	-0,00134	2,47269858	-0,00886
12,10576	2,493681262	2,5E+00	-0,02064	2,46567702	-0,028
11,52235	2,444288324	2,5E+00	0,02157	2,458655621	0,014367
11,88698	2,475443688	2,5E+00	-0,01676	2,451634061	-0,02381
11,6682	2,456867153	2,5E+00	-0,00537	2,444612501	-0,01225
11,59527	2,450597434	2,4E+00	-0,00627	2,437591102	-0,01301
11,44942	2,437938988	2,4E+00	-0,00079	2,430569542	-0,00737
11,44942	2,437938988	2,4E+00	-0,00797	2,423547982	-0,01439
11,30357	2,425118418	2,4E+00	-0,00233	2,416526423	-0,00859
11,30357	2,425118418	2,4E+00	-0,00951	2,409505023	-0,01561
11,08479	2,405574005	2,4E+00	0,002856	2,402483464	-0,00309
11,23064	2,418645964	2,4E+00	-0,01739	2,395461904	-0,02318
11,01186	2,398973037	2,4E+00	-0,0049	2,388440505	-0,01053
10,86601	2,38563963	2,4E+00	0,001255	2,381418945	-0,00422
10,2826	2,330453371	2,4E+00	0,049263	2,374397385	0,043944
10,79309	2,37890566	2,4E+00	-0,00637	2,367375986	-0,01153
10,72016	2,372126037	2,4E+00	-0,00677	2,360354426	-0,01177
10,5743	2,358426962	2,4E+00	-0,00025	2,353332866	-0,00509
10,50138	2,351506583	2,4E+00	-0,0005	2,346311467	-0,0052
10,42845	2,344537979	2,3E+00	-0,00071	2,339289907	-0,00525
10,35553	2,337520472	2,3E+00	-0,00087	2,332268347	-0,00525
10,2826	2,330453371	2,3E+00	-0,00099	2,325246948	-0,00521
10,13675	2,316167362	2,3E+00	0,006121	2,318225389	0,002058
9,990894	2,30167411	2,3E+00	0,013436	2,311203829	0,00953
10,06382	2,308946992	2,3E+00	-0,00102	2,30418243	-0,00476
9,917969	2,294348137	2,3E+00	0,006405	2,29716087	0,002813
9,917969	2,294348137	2,3E+00	-0,00077	2,29013931	-0,00421
10,13675	2,316167362	2,3E+00	-0,02977	2,283117911	-0,03305
9,699192	2,272042588	2,3E+00	0,007175	2,276096351	0,004054
9,626263	2,264495058	2,3E+00	0,007544	2,269074791	0,00458
9,626263	2,264495058	2,3E+00	0,000366	2,262053392	-0,00244
9,480412	2,249227726	2,3E+00	0,008455	2,255031832	0,005804
9,407486	2,241505751	2,3E+00	0,008998	2,248010272	0,006505
9,33456	2,233723684	2,2E+00	0,009602	2,240988873	0,007265

9,480412	2,249227726	2,2E+00	-0,01308	2,233967313	-0,01526
8,751148	2,169184917	2,2E+00	0,059784	2,226945754	0,057761
9,042854	2,201974867	2,2E+00	0,019815	2,219924354	0,017949
9,33456	2,233723684	2,2E+00	-0,01911	2,212902795	-0,02082
9,042854	2,201974867	2,2E+00	0,005458	2,205881235	0,003906
9,11578	2,210006964	2,2E+00	-0,00975	2,198859836	-0,01115
8,824078	2,177484077	2,2E+00	0,015592	2,191838276	0,014354
9,11578	2,210006964	2,2E+00	-0,02411	2,184816716	-0,02519
8,605297	2,152377954	2,2E+00	0,026341	2,177795317	0,025417
8,459444	2,135283456	2,2E+00	0,036257	2,170773757	0,03549
9,042856	2,201975078	2,2E+00	-0,03761	2,163752197	-0,03822
8,459446	2,135283681	2,2E+00	0,0219	2,156730798	0,021447
8,532372	2,143867344	2,2E+00	0,006138	2,149709238	0,005842
8,532372	2,143867344	2,1E+00	-0,00104	2,142687678	-0,00118
8,386518	2,126625474	2,1E+00	0,009023	2,135666279	0,009041
8,53237	2,143867121	2,1E+00	-0,0154	2,12864472	-0,01522
8,313591	2,117891646	2,1E+00	0,0034	2,12162316	0,003732
7,948959	2,073041021	2,1E+00	0,041072	2,114601761	0,041561
8,16774	2,100192233	2,1E+00	0,006742	2,107580201	0,007388
8,240665	2,109081097	2,1E+00	-0,00932	2,100558641	-0,00852
8,16774	2,100192233	2,1E+00	-0,00761	2,093537242	-0,00665
7,948963	2,073041501	2,1E+00	0,012358	2,086515682	0,013474
8,094812	2,091223411	2,1E+00	-0,013	2,079494122	-0,01173
7,876034	2,06382445	2,1E+00	0,007218	2,072472723	0,008648
7,730185	2,045132737	2,1E+00	0,018731	2,065451163	0,020318
7,58433	2,026084225	2,1E+00	0,030601	2,058429603	0,032345
8,386517	2,126625246	2,0E+00	-0,07712	2,051408204	-0,07522
7,58433	2,026084225	2,0E+00	0,016244	2,044386644	0,018302
7,511402	2,01642215	2,0E+00	0,018728	2,037365085	0,020943
7,730183	2,045132491	2,0E+00	-0,01716	2,030343685	-0,01479
7,511406	2,016422658	2,0E+00	0,00437	2,023322126	0,006899
7,657255	2,035653587	2,0E+00	-0,02204	2,016300566	-0,01935
7,511402	2,01642215	2,0E+00	-0,00999	2,009279167	-0,00714
7,438477	2,006666065	2,0E+00	-0,00741	2,002257607	-0,00441
7,292625	1,986863622	2,0E+00	0,005215	1,995236047	0,008372
7,438477	2,006666065	2,0E+00	-0,02177	1,988214648	-0,01845
7,146774	1,966661107	2,0E+00	0,011061	1,981193088	0,014532
7,292625	1,986863622	2,0E+00	-0,01632	1,974171528	-0,01269
7,073845	1,956404166	2,0E+00	0,006961	1,967150129	0,010746
7,511402	2,01642215	2,0E+00	-0,06024	1,960128569	-0,05629
6,709213	1,903481695	1,9E+00	0,045527	1,95310701	0,049625
7,073845	1,956404167	1,9E+00	-0,01457	1,94608561	-0,01032
6,855068	1,924988263	1,9E+00	0,009663	1,939064051	0,014076
6,855068	1,924988263	1,9E+00	0,002485	1,932042491	0,007054
7,438477	2,006666065	1,9E+00	-0,08637	1,925021092	-0,08164

6,490437	1,870329794	1,9E+00	0,042786	1,917999532	0,04767
7,073845	1,956404167	1,9E+00	-0,05047	1,910977972	-0,04543
6,709215	1,903481979	1,9E+00	-0,00472	1,903956573	0,000475
5,688248	1,738402236	1,9E+00	0,153178	1,896935013	0,158533
6,709215	1,903481979	1,9E+00	-0,01908	1,889913453	-0,01357
6,636288	1,892552724	1,9E+00	-0,01533	1,882892054	-0,00966
6,563362	1,88150299	1,9E+00	-0,01146	1,875870494	-0,00563
5,979952	1,788412518	1,9E+00	0,074454	1,868848934	0,080436
6,271658	1,836040745	1,9E+00	0,019647	1,861827535	0,025787
6,344584	1,847601459	1,8E+00	0,000908	1,854805975	0,007205
5,979952	1,788412518	1,8E+00	0,052919	1,847784416	0,059372
6,271656	1,836040441	1,8E+00	-0,00189	1,840763016	0,004723
6,344584	1,847601459	1,8E+00	-0,02063	1,833741457	-0,01386
5,542395	1,712426652	1,8E+00	0,107369	1,826719897	0,114293
6,19873	1,824344508	1,8E+00	-0,01173	1,819698498	-0,00465
5,979954	1,788412836	1,8E+00	0,017026	1,812676938	0,024264
5,250689	1,658359221	1,8E+00	0,139901	1,805655378	0,147296
6,271658	1,836040745	1,8E+00	-0,04496	1,798633979	-0,03741
5,979954	1,788412836	1,8E+00	-0,00451	1,791612419	0,0032
5,979952	1,788412518	1,8E+00	-0,01169	1,784590859	-0,00382
7,365551	1,99681386	1,8E+00	-0,22727	1,77756946	-0,21924
6,052879	1,800534082	1,8E+00	-0,03817	1,7705479	-0,02999
6,271656	1,83604044	1,8E+00	-0,08085	1,763526341	-0,07251
6,198732	1,824344816	1,7E+00	-0,07633	1,756504941	-0,06784
6,052879	1,800534082	1,7E+00	-0,0597	1,749483382	-0,05105
5,761173	1,751141143	1,7E+00	-0,01749	1,742461822	-0,00868
5,688248	1,738402236	1,7E+00	-0,01193	1,735440423	-0,00296
5,761173	1,751141143	1,7E+00	-0,03184	1,728418863	-0,02272
5,61532	1,725498613	1,7E+00	-0,01338	1,721397303	-0,0041
5,542395	1,712426653	1,7E+00	-0,00749	1,714375904	0,001949
5,396544	1,685758657	1,7E+00	0,012003	1,707354344	0,021596
5,761173	1,751141143	1,7E+00	-0,06056	1,700332784	-0,05081
5,61532	1,725498613	1,7E+00	-0,04209	1,693311385	-0,03219
5,396542	1,685758303	1,7E+00	-0,00953	1,686289825	0,000532
4,594353	1,52482788	1,7E+00	0,14422	1,679268265	0,15444
5,25069	1,658359584	1,7E+00	0,00351	1,672246866	0,013887
5,25069	1,658359584	1,7E+00	-0,00367	1,665225306	0,006866
5,396542	1,685758303	1,6E+00	-0,03825	1,658203747	-0,02755
5,907026	1,776142539	1,6E+00	-0,13581	1,651182348	-0,12496
5,250689	1,658359221	1,6E+00	-0,0252	1,644160788	-0,0142
5,834101	1,763720136	1,6E+00	-0,13774	1,637139228	-0,12658
4,958984	1,601200957	1,6E+00	0,017598	1,630117829	0,028917
5,104837	1,630188604	1,6E+00	-0,01857	1,623096269	-0,00709
5,323616	1,672152777	1,6E+00	-0,06771	1,616074709	-0,05608
4,886059	1,586386009	1,6E+00	0,010877	1,60905331	0,022667

4,958984	1,601200957	1,6E+00	-0,01112	1,60203175	0,000831
5,03191	1,615799622	1,6E+00	-0,03289	1,59501019	-0,02079
4,886059	1,586386009	1,6E+00	-0,01066	1,587988791	0,001603
4,958984	1,601200957	1,6E+00	-0,03265	1,580967231	-0,02023
4,594353	1,52482788	1,6E+00	0,036543	1,573945672	0,049118
4,886059	1,586386009	1,6E+00	-0,03219	1,566924272	-0,01946
4,886059	1,586386009	1,5E+00	-0,03937	1,559902713	-0,02648
4,594355	1,524828295	1,5E+00	0,015007	1,552881153	0,028053
4,813131	1,571347877	1,5E+00	-0,03869	1,545859754	-0,02549
4,66728	1,540576503	1,5E+00	-0,0151	1,538838194	-0,00174
4,813133	1,571348273	1,5E+00	-0,05305	1,531816634	-0,03953
4,886057	1,586385618	1,5E+00	-0,07526	1,524795235	-0,06159
4,521427	1,508827686	1,5E+00	-0,00488	1,517773675	0,008946
5,615322	1,725498953	1,5E+00	-0,22873	1,510752115	-0,21475
4,594353	1,52482788	1,5E+00	-0,03524	1,503730716	-0,0211
4,521427	1,508827686	1,5E+00	-0,02642	1,496709156	-0,01212
4,448502	1,492567317	1,5E+00	-0,01734	1,489687596	-0,00288
4,740206	1,556080545	1,5E+00	-0,08803	1,482666197	-0,07341
4,375574	1,476037737	1,5E+00	-0,01517	1,475644637	-0,00039
4,740206	1,556080545	1,5E+00	-0,10239	1,468623238	-0,08746
3,865091	1,35198531	1,4E+00	0,09453	1,461601679	0,109616
4,229723	1,442136501	1,4E+00	-0,0028	1,454580279	0,012444
4,08387	1,407045052	1,4E+00	0,025114	1,44755888	0,040514
3,573385	1,273513392	1,4E+00	0,151467	1,44053716	0,167024
4,08387	1,407045052	1,4E+00	0,010757	1,433515761	0,026471
3,208755	1,165883165	1,4E+00	0,24474	1,426494362	0,260611
4,010944	1,389026717	1,4E+00	0,014418	1,419472641	0,030446
4,156796	1,424744465	1,4E+00	-0,02848	1,412451242	-0,01229
4,08387	1,407045052	1,4E+00	-0,01796	1,405429843	-0,00162
3,938019	1,370677754	1,4E+00	0,011231	1,398408122	0,02773
4,229723	1,442136501	1,4E+00	-0,06741	1,391386723	-0,05075
4,229723	1,442136501	1,4E+00	-0,07458	1,384365324	-0,05777
3,938019	1,370677754	1,4E+00	-0,0103	1,377343603	0,006666
3,792164	1,332936793	1,4E+00	0,020259	1,370322204	0,037385
4,010944	1,389026716	1,3E+00	-0,04301	1,363300805	-0,02573
3,719238	1,313518884	1,3E+00	0,025319	1,356279085	0,04276
3,792166	1,332937295	1,3E+00	-0,00128	1,349257686	0,01632
3,719238	1,313518884	1,3E+00	0,010963	1,342236286	0,028717
3,865091	1,35198531	1,3E+00	-0,03468	1,335214566	-0,01677
3,71924	1,313519397	1,3E+00	-0,00339	1,328193167	0,014674
3,646313	1,293716441	1,3E+00	0,00923	1,321171768	0,027455
3,719238	1,313518884	1,3E+00	-0,01775	1,314150047	0,000631
3,646313	1,293716442	1,3E+00	-0,00513	1,307128648	0,013412
3,573387	1,273513926	1,3E+00	0,007897	1,300107249	0,026593
3,792166	1,332937295	1,3E+00	-0,05871	1,293085528	-0,03985

3,719238	1,313518884	1,3E+00	-0,04647	1,286064129	-0,02745
3,646313	1,293716442	1,3E+00	-0,03384	1,27904273	-0,01467
3,646313	1,293716442	1,3E+00	-0,04102	1,27202101	-0,0217
3,573385	1,273513392	1,2E+00	-0,028	1,26499961	-0,00851
3,792166	1,332937296	1,2E+00	-0,0946	1,257978211	-0,07496
3,427534	1,231841083	1,2E+00	-0,00068	1,250956491	0,019115
2,917049	1,070572629	1,2E+00	0,15341	1,243935092	0,173362
3,427534	1,231841082	1,2E+00	-0,01504	1,236913693	0,005073
3,427532	1,231840526	1,2E+00	-0,02221	1,229891972	-0,00195
3,354609	1,210335083	1,2E+00	-0,00789	1,222870573	0,012535
3,573387	1,273513926	1,2E+00	-0,07824	1,215849174	-0,05766
3,354607	1,210334514	1,2E+00	-0,02224	1,208827453	-0,00151
3,354607	1,210334514	1,2E+00	-0,02942	1,201806054	-0,00853
3,427534	1,231841082	1,2E+00	-0,05811	1,194784655	-0,03706
3,281681	1,18835581	1,2E+00	-0,0218	1,187762934	-0,00059
3,13583	1,142893868	1,2E+00	0,016483	1,180741535	0,037848
3,208754	1,16588257	1,2E+00	-0,01368	1,173720136	0,007838
3,13583	1,142893868	1,1E+00	0,002126	1,166698416	0,023805
3,281681	1,18835581	1,1E+00	-0,05051	1,159677017	-0,02868
3,938017	1,370677269	1,1E+00	-0,24001	1,152655617	-0,21802
3,208755	1,165883165	1,1E+00	-0,0424	1,145633897	-0,02025
3,71924	1,313519397	1,1E+00	-0,19721	1,138612498	-0,17491
3,135828	1,14289326	1,1E+00	-0,03377	1,131591099	-0,0113
3,135828	1,14289326	1,1E+00	-0,04094	1,124569378	-0,01832
3,135828	1,14289326	1,1E+00	-0,04812	1,117547979	-0,02535
3,062902	1,11936298	1,1E+00	-0,03177	1,11052658	-0,00884
3,427534	1,231841082	1,1E+00	-0,15143	1,103504859	-0,12834
2,917051	1,070573282	1,1E+00	0,002662	1,09648346	0,02591
2,844124	1,045255055	1,1E+00	0,020802	1,089462061	0,044207
2,917051	1,070573282	1,1E+00	-0,0117	1,082440341	0,011867
2,917049	1,070572629	1,1E+00	-0,01887	1,075418941	0,004846
3,646311	1,293715918	1,0E+00	-0,24919	1,068397542	-0,22532
2,844124	1,045255055	1,0E+00	-0,00791	1,061375822	0,016121
2,844124	1,045255055	1,0E+00	-0,01509	1,054354423	0,009099
4,010944	1,389026716	1,0E+00	-0,36604	1,047333024	-0,34169
2,771198	1,019279816	1,0E+00	-0,00347	1,040311303	0,021031
2,771198	1,019279816	1,0E+00	-0,01065	1,033289904	0,01401
2,698273	0,992611829	1,0E+00	0,008839	1,026268505	0,033657
2,625345	0,965212404	9,9E-01	0,029059	1,019246784	0,054034
2,55242	0,937041796	9,9E-01	0,050052	1,012225385	0,075184
3,281681	1,188355809	9,8E-01	-0,20844	1,005203986	-0,18315
2,625345	0,965212404	9,7E-01	0,007524	0,998182265	0,03297
2,771196	1,019279128	9,7E-01	-0,05372	0,991160866	-0,02812
2,55242	0,937041796	9,6E-01	0,021338	0,984139467	0,047098
2,55242	0,937041796	9,5E-01	0,014159	0,977117747	0,040076

2,406567	0,878201093	9,4E-01	0,065821	0,970096348	0,091895
1,969007	0,677529605	9,4E-01	0,259315	0,963074948	0,285545
2,625345	0,965212404	9,3E-01	-0,03555	0,956053228	-0,00916
2,917049	1,070572629	9,2E-01	-0,14809	0,949031829	-0,12154
2,771196	1,019279128	9,2E-01	-0,10397	0,94201043	-0,07727
2,479492	0,908053776	9,1E-01	7,63E-05	0,934988709	0,026935
1,896082	0,639789612	9,0E-01	0,261162	0,92796731	0,288178
2,333641	0,847429731	8,9E-01	0,046344	0,920945911	0,073516
2,406567	0,878201093	8,9E-01	0,008394	0,91392419	0,035723
2,406567	0,878201093	8,8E-01	0,001215	0,906902791	0,028702
2,260714	0,815680505	8,7E-01	0,056557	0,899881392	0,084201
2,333639	0,847428914	8,7E-01	0,01763	0,892859672	0,045431
2,406567	0,878201093	8,6E-01	-0,02032	0,885838272	0,007637
2,041935	0,713897872	8,5E-01	0,136805	0,878816873	0,164919
2,041935	0,713897872	8,4E-01	0,129626	0,871795153	0,157897
2,333639	0,847428914	8,4E-01	-0,01108	0,864773754	0,017345
2,333639	0,847428914	8,3E-01	-0,01826	0,857752355	0,010323
1,312672	0,272064497	8,2E-01	0,549924	0,850730634	0,578666
2,333641	0,847429731	8,1E-01	-0,03262	0,843709235	-0,00372
2,406567	0,878201093	8,1E-01	-0,07057	0,836687836	-0,04151
2,260714	0,815680505	8,0E-01	-0,01523	0,829666115	0,013986
2,187788	0,782890992	7,9E-01	0,010384	0,822644716	0,039754
1,458525	0,377425448	7,9E-01	0,408671	0,815623317	0,438198
2,187786	0,782890121	7,8E-01	-0,00397	0,808601596	0,025711
1,969009	0,677530573	7,7E-01	0,094209	0,801580197	0,12405
2,406567	0,878201093	7,6E-01	-0,11364	0,794558798	-0,08364
1,750229	0,559746569	7,6E-01	0,197636	0,787537078	0,227791
2,041935	0,713897872	7,5E-01	0,036306	0,780515679	0,066618
1,969009	0,677530574	7,4E-01	0,065495	0,773494279	0,095964
2,041935	0,713897872	7,4E-01	0,021949	0,766472559	0,052575
2,114861	0,748988869	7,3E-01	-0,02032	0,75945116	0,010462