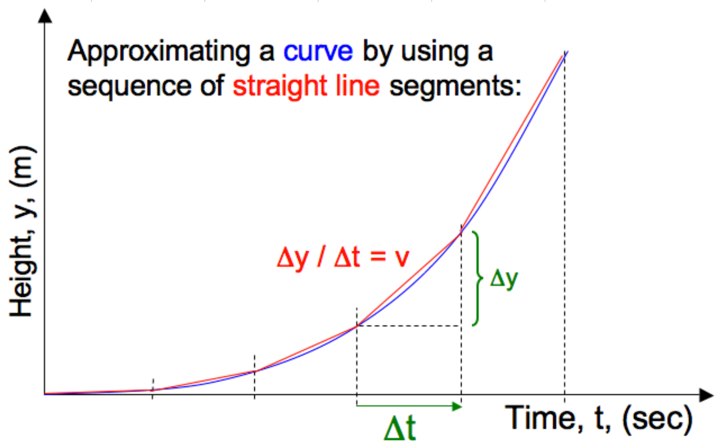
This assignment continues the idea of solving a difficult math problem by breaking the motion into small, linear steps.



Here we examine the complicated situation of rocket accelerating from rest (v0 = 0) at a constant rate (a = constant) for some amount of time t until the fuel runs out and then coasting upward against both gravity and air friction. Once at the top of its flight, the downward motion is accelerated by gravity but slowed by air friction.
We want to know the height y and velocity v of the rocket at any given time.

Like the previous assignment, we'll break the time into small increments (delta t) then pretend that the object moves at a constant velocity during each time increment.
After each increment, we'll change the velocity using our v = v0 + a*t formula.
As in the previous assignment, the formula is "reinterpreted" to mean:

v_at_this_time_increment = v_at_previous_time_increment + a * delta_t

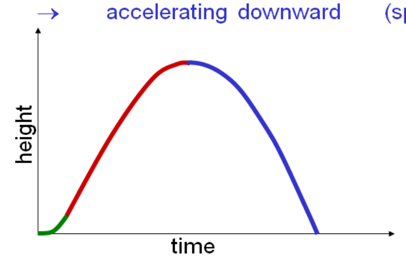
This means when the next time interval comes, the position x = x0 + v * delta_t will change even more because the v is different than it was in the previous time increment.

Now we get to the tricky part.

Phase 1: From video analysis of a rocket flight we've seen that the rocket accelerates upward while the water (fuel) lasts. This is the green section of the graph shown above. You can tell the rocket's velocity is increasing because the curve is "curving upward" ... meaning the slope of a line tangent to the curve is increasing.
(Remember, the slope on a position vs. time graph is the velocity.)
This +acceleration time is typically around 0.18 seconds.

Three phases of flight:

Movement		Acceleration Direction	Velocity
1: UP	→	accelerating upward	(speeding up)
2: UP	→	accelerating downward	(slowing down)
3: DOWN	→	accelerating downward	(speeding up)



Phase 2: The rocket is out of fuel but has a large positive (upward) velocity.
There are 2 forces acting on the rocket at this point: gravity and air friction.
Both forces are directed downward. Together, they slow the rocket to a stop at the top of its flight. The gravitational force is just the weight of the rocket without water.
The air friction force depends on the rocket's velocity. We will model the force as:

Drag = b v^2

where b = one fourth of the rocket's "cross sectional area" and v = rocket's velocity
This means the rocket's acceleration (from Sum F = ma) will depend on its velocity.
We get the formula for 'a' by simply dividing the sum of forces (weight + air friction) by the rocket's mass.

$$a = \frac{Weight - Drag}{mass} = \frac{\left(-mg - bv^2\right)}{m} = -g - \frac{bv^2}{m}$$

Phase 3: The rocket falls, gaining velocity and thus experiencing increased air friction.
Eventually, the rocket reaches terminal velocity (constant velocity) when the upwar air friction force balances the downward force of gravity.
As in phase 2, we get the acceleration 'a' by dividing sum of forces by the rocket mass except this time the air friction is in the opposite direction from gravity so sum of forces = weight - air friction.

Here is what you need to do:

1: Enter the mass of your rocket (mass without water) in the GREEN table below.

initialized to 1.234 kg which is an unallowable mass... so change it to yours

2: Use the formula given in class to compute the initial (at launch) acceleration of your rocket.

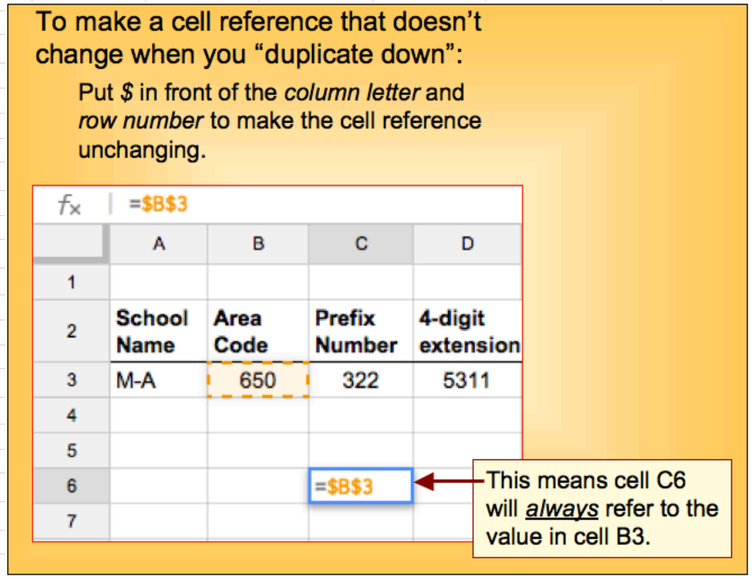
this formula computes Thrust (force) via the air pressure in the bottle and the area of the bottle's mouth

we will assume that this acceleration remains constant until the water runs out

this assumption is only approximately true but is supported by the video analysis of the rocket flight

3: Set the acceleration value for Step #0 and Step #1 to the acceleration value you just computed

use the absolute cell reference to do this, referring to cell C(row with launch acceleration)



4: enter formula for position at Step #1 that computes x as:

y = y_of_previous_step + v_of_previous_step * time_increment

your entry should reference the time increment value as an absolute cell position (using Crow#)

this is the same as you did for the first assignment since it is the general technique we're using

5: enter formula for velocity at Step #1 that computes v as:

v = v_of_previous_step + a_of_previous_step * time_increment

this is the same as you did for the first assignment since it is the general technique we're using

6: duplicate thru Water Runs Out time the position, velocity, and acceleration cells you just defined

this computes y, v, and a values during the thrust phase (phase 1 in graph above)

7: change acceleration at first time increment after water runs out

acceleration will now be the sum of forces divided by total mass of empty rocket

forces are: weight + air friction with air friction = b * v^2

where v is the velocity of the previous time step and b = cross-sectional-Area / 4

8: duplicate the height, velocity, and acceleration down thru more time steps until....?

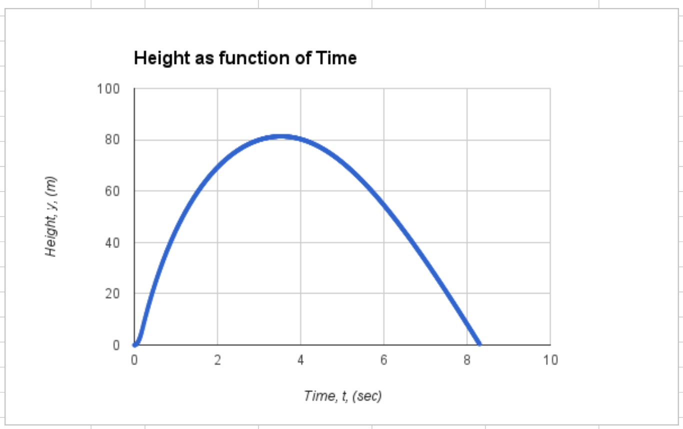
I'm leaving it to you to figure out when Phase 2 ends... how will you know?

9: phase 3 starts after phase 2... change acceleration & duplicate thru more time steps until....?

I'm leaving it to you to figure out when Phase 3 ends... how will you know?

Launch Tube Diameter:	0.84	inches
Launch Tube Area:	3.57	cm^2
Launch Tube Pressure:	68.2	N/cm^2
Initial Force:	487.4	N

Time Increment:	0.010	seconds
Water Runs out Time:	0.180	seconds
Rocket Mass (empty):	0.400	kg
Launch acceleration:	348.163	meters/sec^2
Cross Sectional Area:	0.010	meters^2
b	0.005	kg / m



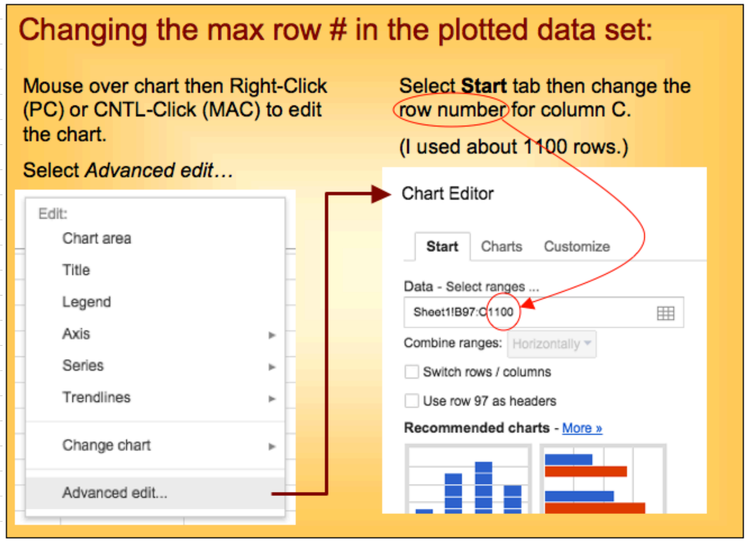
columns N, O, P below here won't be on Doctopus dissemination

Required Reports & Calculations:

Initial Acceleration detail	348.2	m/s^2	F_launch / (1+mass)
height at water out:	5.3	m	at t = 0.18 s
velocity at water out:	62.7	m/s	at t = 0.18 s
Max Height:	81.3	m/s^2	where v = 0
Max Eg:	318.8	J	mgh
V final (no air):	39.9	m/s	sqrt(2gh)
V final (w/ air):	26.1	m/s	where y = 0
Vterm reached ?	NO		b/c a_final not equal to zero
Final Ek:	136.4	J	1/2 m v^2
Energy lost to air:	182.4	J	Ek w/ - w/o air
% E lost to air friction:	57.2	%	
Delta Length:	0.04	m	Lf - Lo measured
Collision Force:	3410	N	work = F * d
Collision Acceleration:	8525	m/s^2	a = F / m

Step #	Time, t	Height, y	velocity, v	acceleration, a
0	0.000	0.000	0.000	348.163
1	0.010	0.000	3.482	348.163
2	0.020	0.035	6.963	348.163
3	0.030	0.104	10.445	348.163
4	0.040	0.209	13.927	348.163
5	0.050	0.348	17.408	348.163
6	0.060	0.522	20.890	348.163
7	0.070	0.731	24.371	348.163
8	0.080	0.975	27.853	348.163
9	0.090	1.253	31.335	348.163
10	0.100	1.567	34.816	348.163
11	0.110	1.915	38.298	348.163
12	0.120	2.298	41.780	348.163

13	0.130	2.716	45.261	348.163
14	0.140	3.168	48.743	348.163
15	0.150	3.656	52.224	348.163
16	0.160	4.178	55.706	348.163
17	0.170	4.735	59.188	348.163
18	0.180	5.327	62.669	348.163
19	0.190	5.954	66.151	-64.499
20	0.200	6.615	65.506	-63.438
21	0.210	7.270	64.872	-62.404
22	0.220	7.919	64.248	-61.397
23	0.230	8.561	63.634	-60.415
24	0.240	9.198	63.029	-59.459
25	0.250	9.828	62.435	-58.526
26	0.260	10.452	61.850	-57.617
27	0.270	11.071	61.273	-56.730
28	0.280	11.684	60.706	-55.865
29	0.290	12.291	60.147	-55.021
30	0.300	12.892	59.597	-54.198
31	0.310	13.488	59.055	-53.394
32	0.320	14.079	58.521	-52.609
33	0.330	14.664	57.995	-51.843
34	0.340	15.244	57.477	-51.095
35	0.350	15.819	56.966	-50.364
36	0.360	16.388	56.462	-49.650
37	0.370	16.953	55.966	-48.952
38	0.380	17.512	55.476	-48.270
39	0.390	18.067	54.994	-47.604
40	0.400	18.617	54.517	-46.952
41	0.410	19.162	54.048	-46.315
42	0.420	19.703	53.585	-45.692
43	0.430	20.239	53.128	-45.082
44	0.440	20.770	52.677	-44.486
45	0.450	21.297	52.232	-43.903
46	0.460	21.819	51.793	-43.332
47	0.470	22.337	51.360	-42.773
48	0.480	22.851	50.932	-42.226
49	0.490	23.360	50.510	-41.691
50	0.500	23.865	50.093	-41.166
51	0.510	24.366	49.681	-40.653
52	0.520	24.863	49.275	-40.150
53	0.530	25.356	48.873	-39.657
54	0.540	25.844	48.477	-39.175
55	0.550	26.329	48.085	-38.702
56	0.560	26.810	47.698	-38.239
57	0.570	27.287	47.316	-37.785
58	0.580	27.760	46.938	-37.339
59	0.590	28.229	46.564	-36.903
60	0.600	28.695	46.195	-36.475
61	0.610	29.157	45.831	-36.055
62	0.620	29.615	45.470	-35.644
63	0.630	30.070	45.114	-35.240
64	0.640	30.521	44.761	-34.844
65	0.650	30.969	44.413	-34.456
66	0.660	31.413	44.068	-34.075
67	0.670	31.854	43.727	-33.701
68	0.680	32.291	43.390	-33.334
69	0.690	32.725	43.057	-32.974



70	0.700	33.155	42.727	-32.620
71	0.710	33.583	42.401	-32.273
72	0.720	34.007	42.078	-31.932
73	0.730	34.427	41.759	-31.598
74	0.740	34.845	41.443	-31.269
75	0.750	35.259	41.130	-30.946
76	0.760	35.671	40.821	-30.629
77	0.770	36.079	40.515	-30.318
78	0.780	36.484	40.211	-30.012
79	0.790	36.886	39.911	-29.711
80	0.800	37.285	39.614	-29.416
81	0.810	37.681	39.320	-29.126
82	0.820	38.075	39.029	-28.841
83	0.830	38.465	38.740	-28.560
84	0.840	38.852	38.455	-28.285
85	0.850	39.237	38.172	-28.014
86	0.860	39.619	37.892	-27.747
87	0.870	39.997	37.614	-27.485
88	0.880	40.374	37.339	-27.228
89	0.890	40.747	37.067	-26.975
90	0.900	41.118	36.797	-26.726
91	0.910	41.486	36.530	-26.481
92	0.920	41.851	36.265	-26.240
93	0.930	42.214	36.003	-26.003
94	0.940	42.574	35.743	-25.769
95	0.950	42.931	35.485	-25.540
96	0.960	43.286	35.230	-25.314
97	0.970	43.638	34.977	-25.092
98	0.980	43.988	34.726	-24.874
99	0.990	44.335	34.477	-24.658
100	1.000	44.680	34.230	-24.447
101	1.010	45.022	33.986	-24.238
102	1.020	45.362	33.744	-24.033
103	1.030	45.700	33.503	-23.831
104	1.040	46.035	33.265	-23.632
105	1.050	46.367	33.029	-23.436
106	1.060	46.698	32.794	-23.243
107	1.070	47.026	32.562	-23.053
108	1.080	47.351	32.331	-22.866
109	1.090	47.674	32.103	-22.682
110	1.100	47.995	31.876	-22.501
111	1.110	48.314	31.651	-22.322
112	1.120	48.631	31.428	-22.146
113	1.130	48.945	31.206	-21.973
114	1.140	49.257	30.986	-21.802
115	1.150	49.567	30.768	-21.634
116	1.160	49.875	30.552	-21.468
117	1.170	50.180	30.337	-21.304
118	1.180	50.484	30.124	-21.143
119	1.190	50.785	29.913	-20.985
120	1.200	51.084	29.703	-20.828
121	1.210	51.381	29.495	-20.674
122	1.220	51.676	29.288	-20.522
123	1.230	51.969	29.083	-20.373
124	1.240	52.260	28.879	-20.225
125	1.250	52.548	28.677	-20.080
126	1.260	52.835	28.476	-19.936

127	1.270	53.120	28.277	-19.795
128	1.280	53.403	28.079	-19.655
129	1.290	53.683	27.882	-19.518
130	1.300	53.962	27.687	-19.382
131	1.310	54.239	27.493	-19.248
132	1.320	54.514	27.301	-19.117
133	1.330	54.787	27.110	-18.987
134	1.340	55.058	26.920	-18.858
135	1.350	55.327	26.731	-18.732
136	1.360	55.595	26.544	-18.607
137	1.370	55.860	26.358	-18.484
138	1.380	56.124	26.173	-18.363
139	1.390	56.385	25.989	-18.243
140	1.400	56.645	25.807	-18.125
141	1.410	56.903	25.626	-18.008
142	1.420	57.160	25.445	-17.893
143	1.430	57.414	25.267	-17.780
144	1.440	57.667	25.089	-17.668
145	1.450	57.918	24.912	-17.558
146	1.460	58.167	24.736	-17.449
147	1.470	58.414	24.562	-17.341
148	1.480	58.660	24.389	-17.235
149	1.490	58.904	24.216	-17.130
150	1.500	59.146	24.045	-17.027
151	1.510	59.386	23.875	-16.925
152	1.520	59.625	23.705	-16.824
153	1.530	59.862	23.537	-16.725
154	1.540	60.097	23.370	-16.627
155	1.550	60.331	23.204	-16.530
156	1.560	60.563	23.038	-16.435
157	1.570	60.794	22.874	-16.340
158	1.580	61.022	22.711	-16.247
159	1.590	61.249	22.548	-16.155
160	1.600	61.475	22.387	-16.064
161	1.610	61.699	22.226	-15.975
162	1.620	61.921	22.066	-15.886
163	1.630	62.142	21.907	-15.799
164	1.640	62.361	21.749	-15.713
165	1.650	62.578	21.592	-15.628
166	1.660	62.794	21.436	-15.544
167	1.670	63.009	21.280	-15.461
168	1.680	63.221	21.126	-15.379
169	1.690	63.433	20.972	-15.298
170	1.700	63.642	20.819	-15.218
171	1.710	63.850	20.667	-15.139
172	1.720	64.057	20.516	-15.061
173	1.730	64.262	20.365	-14.984
174	1.740	64.466	20.215	-14.908
175	1.750	64.668	20.066	-14.833
176	1.760	64.869	19.918	-14.759
177	1.770	65.068	19.770	-14.686
178	1.780	65.266	19.623	-14.613
179	1.790	65.462	19.477	-14.542
180	1.800	65.657	19.332	-14.471
181	1.810	65.850	19.187	-14.402
182	1.820	66.042	19.043	-14.333
183	1.830	66.232	18.900	-14.265

184	1.840	66.421	18.757	-14.198
185	1.850	66.609	18.615	-14.131
186	1.860	66.795	18.474	-14.066
187	1.870	66.980	18.333	-14.001
188	1.880	67.163	18.193	-13.937
189	1.890	67.345	18.054	-13.874
190	1.900	67.526	17.915	-13.812
191	1.910	67.705	17.777	-13.750
192	1.920	67.882	17.639	-13.689
193	1.930	68.059	17.502	-13.629
194	1.940	68.234	17.366	-13.570
195	1.950	68.408	17.230	-13.511
196	1.960	68.580	17.095	-13.453
197	1.970	68.751	16.961	-13.396
198	1.980	68.920	16.827	-13.339
199	1.990	69.089	16.693	-13.283
200	2.000	69.256	16.561	-13.228
201	2.010	69.421	16.428	-13.174
202	2.020	69.585	16.297	-13.120
203	2.030	69.748	16.165	-13.066
204	2.040	69.910	16.035	-13.014
205	2.050	70.070	15.905	-12.962
206	2.060	70.229	15.775	-12.911
207	2.070	70.387	15.646	-12.860
208	2.080	70.544	15.517	-12.810
209	2.090	70.699	15.389	-12.760
210	2.100	70.853	15.262	-12.711
211	2.110	71.005	15.134	-12.663
212	2.120	71.157	15.008	-12.615
213	2.130	71.307	14.882	-12.568
214	2.140	71.456	14.756	-12.522
215	2.150	71.603	14.631	-12.476
216	2.160	71.749	14.506	-12.430
217	2.170	71.895	14.382	-12.385
218	2.180	72.038	14.258	-12.341
219	2.190	72.181	14.134	-12.297
220	2.200	72.322	14.011	-12.254
221	2.210	72.462	13.889	-12.211
222	2.220	72.601	13.767	-12.169
223	2.230	72.739	13.645	-12.127
224	2.240	72.875	13.524	-12.086
225	2.250	73.011	13.403	-12.045
226	2.260	73.145	13.282	-12.005
227	2.270	73.277	13.162	-11.966
228	2.280	73.409	13.043	-11.926
229	2.290	73.540	12.924	-11.888
230	2.300	73.669	12.805	-11.849
231	2.310	73.797	12.686	-11.812
232	2.320	73.924	12.568	-11.774
233	2.330	74.049	12.450	-11.738
234	2.340	74.174	12.333	-11.701
235	2.350	74.297	12.216	-11.665
236	2.360	74.419	12.099	-11.630
237	2.370	74.540	11.983	-11.595
238	2.380	74.660	11.867	-11.560
239	2.390	74.779	11.751	-11.526
240	2.400	74.896	11.636	-11.492

241	2.410	75.013	11.521	-11.459
242	2.420	75.128	11.407	-11.426
243	2.430	75.242	11.292	-11.394
244	2.440	75.355	11.178	-11.362
245	2.450	75.467	11.065	-11.330
246	2.460	75.577	10.951	-11.299
247	2.470	75.687	10.838	-11.268
248	2.480	75.795	10.726	-11.238
249	2.490	75.903	10.613	-11.208
250	2.500	76.009	10.501	-11.178
251	2.510	76.114	10.390	-11.149
252	2.520	76.218	10.278	-11.120
253	2.530	76.320	10.167	-11.092
254	2.540	76.422	10.056	-11.064
255	2.550	76.523	9.945	-11.036
256	2.560	76.622	9.835	-11.009
257	2.570	76.720	9.725	-10.982
258	2.580	76.818	9.615	-10.956
259	2.590	76.914	9.505	-10.929
260	2.600	77.009	9.396	-10.904
261	2.610	77.103	9.287	-10.878
262	2.620	77.196	9.178	-10.853
263	2.630	77.287	9.070	-10.828
264	2.640	77.378	8.962	-10.804
265	2.650	77.468	8.853	-10.780
266	2.660	77.556	8.746	-10.756
267	2.670	77.644	8.638	-10.733
268	2.680	77.730	8.531	-10.710
269	2.690	77.815	8.424	-10.687
270	2.700	77.900	8.317	-10.665
271	2.710	77.983	8.210	-10.643
272	2.720	78.065	8.104	-10.621
273	2.730	78.146	7.998	-10.600
274	2.740	78.226	7.892	-10.578
275	2.750	78.305	7.786	-10.558
276	2.760	78.383	7.680	-10.537
277	2.770	78.460	7.575	-10.517
278	2.780	78.535	7.470	-10.497
279	2.790	78.610	7.365	-10.478
280	2.800	78.684	7.260	-10.459
281	2.810	78.756	7.155	-10.440
282	2.820	78.828	7.051	-10.421
283	2.830	78.898	6.947	-10.403
284	2.840	78.968	6.843	-10.385
285	2.850	79.036	6.739	-10.368
286	2.860	79.104	6.635	-10.350
287	2.870	79.170	6.532	-10.333
288	2.880	79.235	6.428	-10.317
289	2.890	79.300	6.325	-10.300
290	2.900	79.363	6.222	-10.284
291	2.910	79.425	6.119	-10.268
292	2.920	79.486	6.017	-10.252
293	2.930	79.546	5.914	-10.237
294	2.940	79.605	5.812	-10.222
295	2.950	79.664	5.710	-10.207
296	2.960	79.721	5.607	-10.193
297	2.970	79.777	5.505	-10.179

298	2.980	79.832	5.404	-10.165
299	2.990	79.886	5.302	-10.151
300	3.000	79.939	5.201	-10.138
301	3.010	79.991	5.099	-10.125
302	3.020	80.042	4.998	-10.112
303	3.030	80.092	4.897	-10.100
304	3.040	80.141	4.796	-10.087
305	3.050	80.189	4.695	-10.076
306	3.060	80.236	4.594	-10.064
307	3.070	80.282	4.494	-10.052
308	3.080	80.327	4.393	-10.041
309	3.090	80.371	4.293	-10.030
310	3.100	80.413	4.192	-10.020
311	3.110	80.455	4.092	-10.009
312	3.120	80.496	3.992	-9.999
313	3.130	80.536	3.892	-9.989
314	3.140	80.575	3.792	-9.980
315	3.150	80.613	3.692	-9.970
316	3.160	80.650	3.593	-9.961
317	3.170	80.686	3.493	-9.953
318	3.180	80.721	3.393	-9.944
319	3.190	80.755	3.294	-9.936
320	3.200	80.788	3.195	-9.928
321	3.210	80.820	3.095	-9.920
322	3.220	80.851	2.996	-9.912
323	3.230	80.881	2.897	-9.905
324	3.240	80.910	2.798	-9.898
325	3.250	80.938	2.699	-9.891
326	3.260	80.965	2.600	-9.885
327	3.270	80.991	2.501	-9.878
328	3.280	81.016	2.403	-9.872
329	3.290	81.040	2.304	-9.866
330	3.300	81.063	2.205	-9.861
331	3.310	81.085	2.107	-9.855
332	3.320	81.106	2.008	-9.850
333	3.330	81.126	1.909	-9.846
334	3.340	81.145	1.811	-9.841
335	3.350	81.163	1.713	-9.837
336	3.360	81.180	1.614	-9.833
337	3.370	81.196	1.516	-9.829
338	3.380	81.211	1.418	-9.825
339	3.390	81.226	1.319	-9.822
340	3.400	81.239	1.221	-9.819
341	3.410	81.251	1.123	-9.816
342	3.420	81.262	1.025	-9.813
343	3.430	81.272	0.927	-9.811
344	3.440	81.282	0.829	-9.809
345	3.450	81.290	0.730	-9.807
346	3.460	81.297	0.632	-9.805
347	3.470	81.304	0.534	-9.804
348	3.480	81.309	0.436	-9.802
349	3.490	81.313	0.338	-9.801
350	3.500	81.317	0.240	-9.801
351	3.510	81.319	0.142	-9.800
352	3.520	81.321	0.044	-9.800
353	3.530	81.321	-0.054	-9.800
354	3.540	81.320	-0.152	-9.800

355	3.550	81.319	-0.250	-9.799
356	3.560	81.316	-0.348	-9.798
357	3.570	81.313	-0.446	-9.798
358	3.580	81.309	-0.544	-9.796
359	3.590	81.303	-0.642	-9.795
360	3.600	81.297	-0.740	-9.793
361	3.610	81.289	-0.838	-9.791
362	3.620	81.281	-0.935	-9.789
363	3.630	81.272	-1.033	-9.787
364	3.640	81.261	-1.131	-9.784
365	3.650	81.250	-1.229	-9.781
366	3.660	81.238	-1.327	-9.778
367	3.670	81.224	-1.425	-9.775
368	3.680	81.210	-1.522	-9.771
369	3.690	81.195	-1.620	-9.767
370	3.700	81.179	-1.718	-9.763
371	3.710	81.162	-1.815	-9.759
372	3.720	81.143	-1.913	-9.754
373	3.730	81.124	-2.011	-9.749
374	3.740	81.104	-2.108	-9.744
375	3.750	81.083	-2.205	-9.739
376	3.760	81.061	-2.303	-9.734
377	3.770	81.038	-2.400	-9.728
378	3.780	81.014	-2.497	-9.722
379	3.790	80.989	-2.595	-9.716
380	3.800	80.963	-2.692	-9.709
381	3.810	80.936	-2.789	-9.703
382	3.820	80.908	-2.886	-9.696
383	3.830	80.879	-2.983	-9.689
384	3.840	80.850	-3.080	-9.681
385	3.850	80.819	-3.177	-9.674
386	3.860	80.787	-3.273	-9.666
387	3.870	80.754	-3.370	-9.658
388	3.880	80.721	-3.467	-9.650
389	3.890	80.686	-3.563	-9.641
390	3.900	80.650	-3.660	-9.633
391	3.910	80.614	-3.756	-9.624
392	3.920	80.576	-3.852	-9.615
393	3.930	80.538	-3.948	-9.605
394	3.940	80.498	-4.044	-9.596
395	3.950	80.458	-4.140	-9.586
396	3.960	80.416	-4.236	-9.576
397	3.970	80.374	-4.332	-9.565
398	3.980	80.331	-4.427	-9.555
399	3.990	80.286	-4.523	-9.544
400	4.000	80.241	-4.618	-9.533
401	4.010	80.195	-4.714	-9.522
402	4.020	80.148	-4.809	-9.511
403	4.030	80.100	-4.904	-9.499
404	4.040	80.051	-4.999	-9.488
405	4.050	80.001	-5.094	-9.476
406	4.060	79.950	-5.189	-9.463
407	4.070	79.898	-5.283	-9.451
408	4.080	79.845	-5.378	-9.438
409	4.090	79.791	-5.472	-9.426
410	4.100	79.736	-5.567	-9.413
411	4.110	79.681	-5.661	-9.399

412	4.120	79.624	-5.755	-9.386
413	4.130	79.567	-5.849	-9.372
414	4.140	79.508	-5.942	-9.359
415	4.150	79.449	-6.036	-9.345
416	4.160	79.388	-6.129	-9.330
417	4.170	79.327	-6.223	-9.316
418	4.180	79.265	-6.316	-9.301
419	4.190	79.202	-6.409	-9.287
420	4.200	79.138	-6.502	-9.272
421	4.210	79.073	-6.594	-9.256
422	4.220	79.007	-6.687	-9.241
423	4.230	78.940	-6.779	-9.226
424	4.240	78.872	-6.872	-9.210
425	4.250	78.803	-6.964	-9.194
426	4.260	78.734	-7.056	-9.178
427	4.270	78.663	-7.147	-9.161
428	4.280	78.592	-7.239	-9.145
429	4.290	78.519	-7.330	-9.128
430	4.300	78.446	-7.422	-9.111
431	4.310	78.372	-7.513	-9.094
432	4.320	78.297	-7.604	-9.077
433	4.330	78.221	-7.695	-9.060
434	4.340	78.144	-7.785	-9.042
435	4.350	78.066	-7.876	-9.025
436	4.360	77.987	-7.966	-9.007
437	4.370	77.907	-8.056	-8.989
438	4.380	77.827	-8.146	-8.971
439	4.390	77.745	-8.236	-8.952
440	4.400	77.663	-8.325	-8.934
441	4.410	77.580	-8.414	-8.915
442	4.420	77.496	-8.504	-8.896
443	4.430	77.411	-8.592	-8.877
444	4.440	77.325	-8.681	-8.858
445	4.450	77.238	-8.770	-8.839
446	4.460	77.150	-8.858	-8.819
447	4.470	77.061	-8.946	-8.800
448	4.480	76.972	-9.034	-8.780
449	4.490	76.882	-9.122	-8.760
450	4.500	76.790	-9.210	-8.740
451	4.510	76.698	-9.297	-8.720
452	4.520	76.605	-9.384	-8.699
453	4.530	76.512	-9.471	-8.679
454	4.540	76.417	-9.558	-8.658
455	4.550	76.321	-9.645	-8.637
456	4.560	76.225	-9.731	-8.616
457	4.570	76.127	-9.817	-8.595
458	4.580	76.029	-9.903	-8.574
459	4.590	75.930	-9.989	-8.553
460	4.600	75.830	-10.075	-8.531
461	4.610	75.730	-10.160	-8.510
462	4.620	75.628	-10.245	-8.488
463	4.630	75.526	-10.330	-8.466
464	4.640	75.422	-10.414	-8.444
465	4.650	75.318	-10.499	-8.422
466	4.660	75.213	-10.583	-8.400
467	4.670	75.107	-10.667	-8.378
468	4.680	75.001	-10.751	-8.355

469	4.690	74.893	-10.834	-8.333
470	4.700	74.785	-10.918	-8.310
471	4.710	74.676	-11.001	-8.287
472	4.720	74.566	-11.084	-8.264
473	4.730	74.455	-11.166	-8.241
474	4.740	74.343	-11.249	-8.218
475	4.750	74.231	-11.331	-8.195
476	4.760	74.117	-11.413	-8.172
477	4.770	74.003	-11.495	-8.148
478	4.780	73.888	-11.576	-8.125
479	4.790	73.772	-11.657	-8.101
480	4.800	73.656	-11.738	-8.078
481	4.810	73.539	-11.819	-8.054
482	4.820	73.420	-11.900	-8.030
483	4.830	73.301	-11.980	-8.006
484	4.840	73.182	-12.060	-7.982
485	4.850	73.061	-12.140	-7.958
486	4.860	72.940	-12.219	-7.934
487	4.870	72.817	-12.299	-7.909
488	4.880	72.694	-12.378	-7.885
489	4.890	72.571	-12.457	-7.860
490	4.900	72.446	-12.535	-7.836
491	4.910	72.321	-12.614	-7.811
492	4.920	72.195	-12.692	-7.786
493	4.930	72.068	-12.770	-7.762
494	4.940	71.940	-12.847	-7.737
495	4.950	71.811	-12.925	-7.712
496	4.960	71.682	-13.002	-7.687
497	4.970	71.552	-13.079	-7.662
498	4.980	71.421	-13.155	-7.637
499	4.990	71.290	-13.232	-7.612
500	5.000	71.158	-13.308	-7.586
501	5.010	71.024	-13.384	-7.561
502	5.020	70.891	-13.459	-7.536
503	5.030	70.756	-13.535	-7.510
504	5.040	70.621	-13.610	-7.485
505	5.050	70.485	-13.685	-7.459
506	5.060	70.348	-13.759	-7.434
507	5.070	70.210	-13.833	-7.408
508	5.080	70.072	-13.908	-7.382
509	5.090	69.933	-13.981	-7.357
510	5.100	69.793	-14.055	-7.331
511	5.110	69.652	-14.128	-7.305
512	5.120	69.511	-14.201	-7.279
513	5.130	69.369	-14.274	-7.253
514	5.140	69.226	-14.347	-7.227
515	5.150	69.083	-14.419	-7.201
516	5.160	68.939	-14.491	-7.175
517	5.170	68.794	-14.563	-7.149
518	5.180	68.648	-14.634	-7.123
519	5.190	68.502	-14.705	-7.097
520	5.200	68.355	-14.776	-7.071
521	5.210	68.207	-14.847	-7.045
522	5.220	68.058	-14.917	-7.018
523	5.230	67.909	-14.988	-6.992
524	5.240	67.759	-15.058	-6.966
525	5.250	67.609	-15.127	-6.940

526	5.260	67.458	-15.197	-6.913
527	5.270	67.306	-15.266	-6.887
528	5.280	67.153	-15.335	-6.861
529	5.290	67.000	-15.403	-6.834
530	5.300	66.846	-15.472	-6.808
531	5.310	66.691	-15.540	-6.781
532	5.320	66.535	-15.608	-6.755
533	5.330	66.379	-15.675	-6.729
534	5.340	66.223	-15.742	-6.702
535	5.350	66.065	-15.809	-6.676
536	5.360	65.907	-15.876	-6.649
537	5.370	65.748	-15.943	-6.623
538	5.380	65.589	-16.009	-6.596
539	5.390	65.429	-16.075	-6.570
540	5.400	65.268	-16.141	-6.544
541	5.410	65.107	-16.206	-6.517
542	5.420	64.945	-16.271	-6.491
543	5.430	64.782	-16.336	-6.464
544	5.440	64.619	-16.401	-6.438
545	5.450	64.455	-16.465	-6.411
546	5.460	64.290	-16.529	-6.385
547	5.470	64.125	-16.593	-6.358
548	5.480	63.959	-16.657	-6.332
549	5.490	63.792	-16.720	-6.306
550	5.500	63.625	-16.783	-6.279
551	5.510	63.457	-16.846	-6.253
552	5.520	63.289	-16.908	-6.226
553	5.530	63.120	-16.971	-6.200
554	5.540	62.950	-17.033	-6.174
555	5.550	62.780	-17.094	-6.147
556	5.560	62.609	-17.156	-6.121
557	5.570	62.437	-17.217	-6.095
558	5.580	62.265	-17.278	-6.068
559	5.590	62.092	-17.339	-6.042
560	5.600	61.919	-17.399	-6.016
561	5.610	61.745	-17.459	-5.990
562	5.620	61.570	-17.519	-5.964
563	5.630	61.395	-17.579	-5.937
564	5.640	61.219	-17.638	-5.911
565	5.650	61.043	-17.697	-5.885
566	5.660	60.866	-17.756	-5.859
567	5.670	60.688	-17.815	-5.833
568	5.680	60.510	-17.873	-5.807
569	5.690	60.331	-17.931	-5.781
570	5.700	60.152	-17.989	-5.755
571	5.710	59.972	-18.046	-5.729
572	5.720	59.792	-18.104	-5.703
573	5.730	59.611	-18.161	-5.677
574	5.740	59.429	-18.217	-5.652
575	5.750	59.247	-18.274	-5.626
576	5.760	59.064	-18.330	-5.600
577	5.770	58.881	-18.386	-5.574
578	5.780	58.697	-18.442	-5.549
579	5.790	58.513	-18.497	-5.523
580	5.800	58.328	-18.553	-5.497
581	5.810	58.142	-18.608	-5.472
582	5.820	57.956	-18.662	-5.446

583	5.830	57.769	-18.717	-5.421
584	5.840	57.582	-18.771	-5.396
585	5.850	57.394	-18.825	-5.370
586	5.860	57.206	-18.879	-5.345
587	5.870	57.017	-18.932	-5.320
588	5.880	56.828	-18.985	-5.294
589	5.890	56.638	-19.038	-5.269
590	5.900	56.448	-19.091	-5.244
591	5.910	56.257	-19.143	-5.219
592	5.920	56.066	-19.196	-5.194
593	5.930	55.874	-19.248	-5.169
594	5.940	55.681	-19.299	-5.144
595	5.950	55.488	-19.351	-5.119
596	5.960	55.295	-19.402	-5.095
597	5.970	55.101	-19.453	-5.070
598	5.980	54.906	-19.504	-5.045
599	5.990	54.711	-19.554	-5.020
600	6.000	54.515	-19.604	-4.996
601	6.010	54.319	-19.654	-4.971
602	6.020	54.123	-19.704	-4.947
603	6.030	53.926	-19.753	-4.923
604	6.040	53.728	-19.803	-4.898
605	6.050	53.530	-19.852	-4.874
606	6.060	53.332	-19.900	-4.850
607	6.070	53.133	-19.949	-4.826
608	6.080	52.933	-19.997	-4.801
609	6.090	52.733	-20.045	-4.777
610	6.100	52.533	-20.093	-4.753
611	6.110	52.332	-20.140	-4.730
612	6.120	52.131	-20.188	-4.706
613	6.130	51.929	-20.235	-4.682
614	6.140	51.726	-20.282	-4.658
615	6.150	51.523	-20.328	-4.635
616	6.160	51.320	-20.374	-4.611
617	6.170	51.116	-20.421	-4.587
618	6.180	50.912	-20.466	-4.564
619	6.190	50.708	-20.512	-4.541
620	6.200	50.502	-20.558	-4.517
621	6.210	50.297	-20.603	-4.494
622	6.220	50.091	-20.648	-4.471
623	6.230	49.884	-20.692	-4.448
624	6.240	49.677	-20.737	-4.425
625	6.250	49.470	-20.781	-4.402
626	6.260	49.262	-20.825	-4.379
627	6.270	49.054	-20.869	-4.356
628	6.280	48.845	-20.912	-4.333
629	6.290	48.636	-20.956	-4.311
630	6.300	48.427	-20.999	-4.288
631	6.310	48.217	-21.042	-4.266
632	6.320	48.006	-21.084	-4.243
633	6.330	47.795	-21.127	-4.221
634	6.340	47.584	-21.169	-4.198
635	6.350	47.372	-21.211	-4.176
636	6.360	47.160	-21.253	-4.154
637	6.370	46.948	-21.294	-4.132
638	6.380	46.735	-21.336	-4.110
639	6.390	46.521	-21.377	-4.088

640	6.400	46.308	-21.418	-4.066
641	6.410	46.094	-21.458	-4.044
642	6.420	45.879	-21.499	-4.023
643	6.430	45.664	-21.539	-4.001
644	6.440	45.449	-21.579	-3.979
645	6.450	45.233	-21.619	-3.958
646	6.460	45.017	-21.658	-3.936
647	6.470	44.800	-21.698	-3.915
648	6.480	44.583	-21.737	-3.894
649	6.490	44.366	-21.776	-3.873
650	6.500	44.148	-21.815	-3.852
651	6.510	43.930	-21.853	-3.831
652	6.520	43.711	-21.891	-3.810
653	6.530	43.492	-21.929	-3.789
654	6.540	43.273	-21.967	-3.768
655	6.550	43.053	-22.005	-3.747
656	6.560	42.833	-22.042	-3.727
657	6.570	42.613	-22.080	-3.706
658	6.580	42.392	-22.117	-3.686
659	6.590	42.171	-22.154	-3.665
660	6.600	41.949	-22.190	-3.645
661	6.610	41.727	-22.227	-3.625
662	6.620	41.505	-22.263	-3.604
663	6.630	41.283	-22.299	-3.584
664	6.640	41.060	-22.335	-3.564
665	6.650	40.836	-22.371	-3.544
666	6.660	40.613	-22.406	-3.525
667	6.670	40.388	-22.441	-3.505
668	6.680	40.164	-22.476	-3.485
669	6.690	39.939	-22.511	-3.466
670	6.700	39.714	-22.546	-3.446
671	6.710	39.489	-22.580	-3.427
672	6.720	39.263	-22.615	-3.407
673	6.730	39.037	-22.649	-3.388
674	6.740	38.810	-22.682	-3.369
675	6.750	38.583	-22.716	-3.350
676	6.760	38.356	-22.750	-3.331
677	6.770	38.129	-22.783	-3.312
678	6.780	37.901	-22.816	-3.293
679	6.790	37.673	-22.849	-3.274
680	6.800	37.444	-22.882	-3.255
681	6.810	37.216	-22.914	-3.237
682	6.820	36.986	-22.947	-3.218
683	6.830	36.757	-22.979	-3.200
684	6.840	36.527	-23.011	-3.181
685	6.850	36.297	-23.043	-3.163
686	6.860	36.067	-23.074	-3.145
687	6.870	35.836	-23.106	-3.127
688	6.880	35.605	-23.137	-3.108
689	6.890	35.373	-23.168	-3.090
690	6.900	35.142	-23.199	-3.073
691	6.910	34.910	-23.230	-3.055
692	6.920	34.677	-23.260	-3.037
693	6.930	34.445	-23.291	-3.019
694	6.940	34.212	-23.321	-3.002
695	6.950	33.979	-23.351	-2.984
696	6.960	33.745	-23.381	-2.967

697	6.970	33.511	-23.410	-2.949
698	6.980	33.277	-23.440	-2.932
699	6.990	33.043	-23.469	-2.915
700	7.000	32.808	-23.498	-2.898
701	7.010	32.573	-23.527	-2.881
702	7.020	32.338	-23.556	-2.864
703	7.030	32.102	-23.585	-2.847
704	7.040	31.867	-23.613	-2.830
705	7.050	31.630	-23.642	-2.813
706	7.060	31.394	-23.670	-2.797
707	7.070	31.157	-23.698	-2.780
708	7.080	30.920	-23.725	-2.764
709	7.090	30.683	-23.753	-2.747
710	7.100	30.446	-23.781	-2.731
711	7.110	30.208	-23.808	-2.715
712	7.120	29.970	-23.835	-2.699
713	7.130	29.731	-23.862	-2.683
714	7.140	29.493	-23.889	-2.667
715	7.150	29.254	-23.915	-2.651
716	7.160	29.015	-23.942	-2.635
717	7.170	28.775	-23.968	-2.619
718	7.180	28.536	-23.995	-2.603
719	7.190	28.296	-24.021	-2.588
720	7.200	28.055	-24.046	-2.572
721	7.210	27.815	-24.072	-2.557
722	7.220	27.574	-24.098	-2.541
723	7.230	27.333	-24.123	-2.526
724	7.240	27.092	-24.148	-2.511
725	7.250	26.851	-24.174	-2.496
726	7.260	26.609	-24.198	-2.480
727	7.270	26.367	-24.223	-2.465
728	7.280	26.125	-24.248	-2.450
729	7.290	25.882	-24.272	-2.436
730	7.300	25.639	-24.297	-2.421
731	7.310	25.396	-24.321	-2.406
732	7.320	25.153	-24.345	-2.391
733	7.330	24.910	-24.369	-2.377
734	7.340	24.666	-24.393	-2.362
735	7.350	24.422	-24.416	-2.348
736	7.360	24.178	-24.440	-2.334
737	7.370	23.934	-24.463	-2.319
738	7.380	23.689	-24.486	-2.305
739	7.390	23.444	-24.509	-2.291
740	7.400	23.199	-24.532	-2.277
741	7.410	22.954	-24.555	-2.263
742	7.420	22.708	-24.578	-2.249
743	7.430	22.462	-24.600	-2.235
744	7.440	22.216	-24.623	-2.222
745	7.450	21.970	-24.645	-2.208
746	7.460	21.724	-24.667	-2.194
747	7.470	21.477	-24.689	-2.181
748	7.480	21.230	-24.711	-2.167
749	7.490	20.983	-24.732	-2.154
750	7.500	20.736	-24.754	-2.141
751	7.510	20.488	-24.775	-2.127
752	7.520	20.240	-24.797	-2.114
753	7.530	19.992	-24.818	-2.101

754	7.540	19.744	-24.839	-2.088
755	7.550	19.496	-24.860	-2.075
756	7.560	19.247	-24.880	-2.062
757	7.570	18.998	-24.901	-2.049
758	7.580	18.749	-24.921	-2.037
759	7.590	18.500	-24.942	-2.024
760	7.600	18.251	-24.962	-2.011
761	7.610	18.001	-24.982	-1.999
762	7.620	17.751	-25.002	-1.986
763	7.630	17.501	-25.022	-1.974
764	7.640	17.251	-25.042	-1.961
765	7.650	17.001	-25.061	-1.949
766	7.660	16.750	-25.081	-1.937
767	7.670	16.499	-25.100	-1.925
768	7.680	16.248	-25.119	-1.913
769	7.690	15.997	-25.139	-1.901
770	7.700	15.746	-25.158	-1.889
771	7.710	15.494	-25.176	-1.877
772	7.720	15.242	-25.195	-1.865
773	7.730	14.990	-25.214	-1.853
774	7.740	14.738	-25.232	-1.842
775	7.750	14.486	-25.251	-1.830
776	7.760	14.233	-25.269	-1.818
777	7.770	13.981	-25.287	-1.807
778	7.780	13.728	-25.305	-1.795
779	7.790	13.475	-25.323	-1.784
780	7.800	13.222	-25.341	-1.773
781	7.810	12.968	-25.359	-1.762
782	7.820	12.715	-25.377	-1.750
783	7.830	12.461	-25.394	-1.739
784	7.840	12.207	-25.411	-1.728
785	7.850	11.953	-25.429	-1.717
786	7.860	11.698	-25.446	-1.706
787	7.870	11.444	-25.463	-1.695
788	7.880	11.189	-25.480	-1.685
789	7.890	10.935	-25.497	-1.674
790	7.900	10.680	-25.513	-1.663
791	7.910	10.424	-25.530	-1.653
792	7.920	10.169	-25.547	-1.642
793	7.930	9.914	-25.563	-1.632
794	7.940	9.658	-25.579	-1.621
795	7.950	9.402	-25.596	-1.611
796	7.960	9.146	-25.612	-1.601
797	7.970	8.890	-25.628	-1.590
798	7.980	8.634	-25.644	-1.580
799	7.990	8.378	-25.659	-1.570
800	8.000	8.121	-25.675	-1.560
801	8.010	7.864	-25.691	-1.550
802	8.020	7.607	-25.706	-1.540
803	8.030	7.350	-25.722	-1.530
804	8.040	7.093	-25.737	-1.520
805	8.050	6.836	-25.752	-1.510
806	8.060	6.578	-25.767	-1.501
807	8.070	6.320	-25.782	-1.491
808	8.080	6.063	-25.797	-1.481
809	8.090	5.805	-25.812	-1.472
810	8.100	5.547	-25.827	-1.462

811	8.110	5.288	-25.841	-1.453
812	8.120	5.030	-25.856	-1.443
813	8.130	4.771	-25.870	-1.434
814	8.140	4.513	-25.885	-1.425
815	8.150	4.254	-25.899	-1.416
816	8.160	3.995	-25.913	-1.406
817	8.170	3.736	-25.927	-1.397
818	8.180	3.476	-25.941	-1.388
819	8.190	3.217	-25.955	-1.379
820	8.200	2.957	-25.969	-1.370
821	8.210	2.698	-25.982	-1.361
822	8.220	2.438	-25.996	-1.353
823	8.230	2.178	-26.010	-1.344
824	8.240	1.918	-26.023	-1.335
825	8.250	1.658	-26.036	-1.326
826	8.260	1.397	-26.050	-1.318
827	8.270	1.137	-26.063	-1.309
828	8.280	0.876	-26.076	-1.301
829	8.290	0.615	-26.089	-1.292
830	8.300	0.354	-26.102	-1.284
831	8.310	0.093	-26.115	-1.275
832	8.320	-0.168	-26.127	-1.267
833	8.330	-0.429	-26.140	-1.259
834	8.340	-0.690	-26.153	-1.250
835	8.350	-0.952	-26.165	-1.242
836	8.360	-1.214	-26.178	-1.234
837	8.370	-1.475	-26.190	-1.226
838	8.380	-1.737	-26.202	-1.218
839	8.390	-1.999	-26.214	-1.210
840	8.400	-2.261	-26.226	-1.202
841	8.410	-2.524	-26.238	-1.194
842	8.420	-2.786	-26.250	-1.186
843	8.430	-3.049	-26.262	-1.179
844	8.440	-3.311	-26.274	-1.171
845	8.450	-3.574	-26.286	-1.163
846	8.460	-3.837	-26.297	-1.156
847	8.470	-4.100	-26.309	-1.148
848	8.480	-4.363	-26.320	-1.140
849	8.490	-4.626	-26.332	-1.133
850	8.500	-4.889	-26.343	-1.125
851	8.510	-5.153	-26.354	-1.118
852	8.520	-5.416	-26.366	-1.111
853	8.530	-5.680	-26.377	-1.103
854	8.540	-5.944	-26.388	-1.096
855	8.550	-6.208	-26.399	-1.089
856	8.560	-6.472	-26.410	-1.082
857	8.570	-6.736	-26.420	-1.075
858	8.580	-7.000	-26.431	-1.067
859	8.590	-7.264	-26.442	-1.060
860	8.600	-7.529	-26.452	-1.053
861	8.610	-7.793	-26.463	-1.046
862	8.620	-8.058	-26.473	-1.039
863	8.630	-8.323	-26.484	-1.033
864	8.640	-8.587	-26.494	-1.026
865	8.650	-8.852	-26.504	-1.019
866	8.660	-9.117	-26.515	-1.012
867	8.670	-9.383	-26.525	-1.005

868	8.680	-9.648	-26.535	-0.999
869	8.690	-9.913	-26.545	-0.992
870	8.700	-10.179	-26.555	-0.986
871	8.710	-10.444	-26.565	-0.979
872	8.720	-10.710	-26.574	-0.973
873	8.730	-10.976	-26.584	-0.966
874	8.740	-11.241	-26.594	-0.960
875	8.750	-11.507	-26.603	-0.953
876	8.760	-11.773	-26.613	-0.947
877	8.770	-12.039	-26.622	-0.941
878	8.780	-12.306	-26.632	-0.934
879	8.790	-12.572	-26.641	-0.928
880	8.800	-12.838	-26.650	-0.922
881	8.810	-13.105	-26.660	-0.916
882	8.820	-13.371	-26.669	-0.910
883	8.830	-13.638	-26.678	-0.904
884	8.840	-13.905	-26.687	-0.898
885	8.850	-14.172	-26.696	-0.892
886	8.860	-14.439	-26.705	-0.886
887	8.870	-14.706	-26.714	-0.880
888	8.880	-14.973	-26.722	-0.874
889	8.890	-15.240	-26.731	-0.868
890	8.900	-15.508	-26.740	-0.862
891	8.910	-15.775	-26.748	-0.857
892	8.920	-16.042	-26.757	-0.851
893	8.930	-16.310	-26.766	-0.845
894	8.940	-16.578	-26.774	-0.839
895	8.950	-16.845	-26.782	-0.834
896	8.960	-17.113	-26.791	-0.828
897	8.970	-17.381	-26.799	-0.823
898	8.980	-17.649	-26.807	-0.817
899	8.990	-17.917	-26.815	-0.812
900	9.000	-18.185	-26.824	-0.806
901	9.010	-18.454	-26.832	-0.801
902	9.020	-18.722	-26.840	-0.795
903	9.030	-18.990	-26.848	-0.790
904	9.040	-19.259	-26.855	-0.785
905	9.050	-19.527	-26.863	-0.780
906	9.060	-19.796	-26.871	-0.774
907	9.070	-20.065	-26.879	-0.769
908	9.080	-20.333	-26.887	-0.764
909	9.090	-20.602	-26.894	-0.759
910	9.100	-20.871	-26.902	-0.754
911	9.110	-21.140	-26.909	-0.749
912	9.120	-21.409	-26.917	-0.744
913	9.130	-21.678	-26.924	-0.739
914	9.140	-21.948	-26.932	-0.734
915	9.150	-22.217	-26.939	-0.729
916	9.160	-22.486	-26.946	-0.724
917	9.170	-22.756	-26.953	-0.719
918	9.180	-23.025	-26.961	-0.714
919	9.190	-23.295	-26.968	-0.709
920	9.200	-23.565	-26.975	-0.704
921	9.210	-23.834	-26.982	-0.700
922	9.220	-24.104	-26.989	-0.695
923	9.230	-24.374	-26.996	-0.690
924	9.240	-24.644	-27.003	-0.686

925	9.250	-24.914	-27.010	-0.681
926	9.260	-25.184	-27.016	-0.676
927	9.270	-25.454	-27.023	-0.672
928	9.280	-25.725	-27.030	-0.667
929	9.290	-25.995	-27.037	-0.663
930	9.300	-26.265	-27.043	-0.658
931	9.310	-26.536	-27.050	-0.654
932	9.320	-26.806	-27.056	-0.649
933	9.330	-27.077	-27.063	-0.645
934	9.340	-27.347	-27.069	-0.641
935	9.350	-27.618	-27.076	-0.636
936	9.360	-27.889	-27.082	-0.632
937	9.370	-28.160	-27.088	-0.628
938	9.380	-28.431	-27.095	-0.624
939	9.390	-28.702	-27.101	-0.619
940	9.400	-28.973	-27.107	-0.615
941	9.410	-29.244	-27.113	-0.611
942	9.420	-29.515	-27.119	-0.607
943	9.430	-29.786	-27.125	-0.603
944	9.440	-30.057	-27.131	-0.599
945	9.450	-30.329	-27.137	-0.595
946	9.460	-30.600	-27.143	-0.590
947	9.470	-30.871	-27.149	-0.586
948	9.480	-31.143	-27.155	-0.582
949	9.490	-31.414	-27.161	-0.579
950	9.500	-31.686	-27.167	-0.575
951	9.510	-31.958	-27.172	-0.571
952	9.520	-32.229	-27.178	-0.567
953	9.530	-32.501	-27.184	-0.563
954	9.540	-32.773	-27.189	-0.559
955	9.550	-33.045	-27.195	-0.555
956	9.560	-33.317	-27.201	-0.552
957	9.570	-33.589	-27.206	-0.548
958	9.580	-33.861	-27.212	-0.544
959	9.590	-34.133	-27.217	-0.540
960	9.600	-34.405	-27.222	-0.537
961	9.610	-34.677	-27.228	-0.533
962	9.620	-34.950	-27.233	-0.529
963	9.630	-35.222	-27.238	-0.526
964	9.640	-35.494	-27.244	-0.522
965	9.650	-35.767	-27.249	-0.519
966	9.660	-36.039	-27.254	-0.515
967	9.670	-36.312	-27.259	-0.512
968	9.680	-36.584	-27.264	-0.508
969	9.690	-36.857	-27.269	-0.505
970	9.700	-37.130	-27.275	-0.501
971	9.710	-37.403	-27.280	-0.498
972	9.720	-37.675	-27.285	-0.494
973	9.730	-37.948	-27.289	-0.491
974	9.740	-38.221	-27.294	-0.488
975	9.750	-38.494	-27.299	-0.484
976	9.760	-38.767	-27.304	-0.481
977	9.770	-39.040	-27.309	-0.478
978	9.780	-39.313	-27.314	-0.475
979	9.790	-39.586	-27.318	-0.471
980	9.800	-39.859	-27.323	-0.468
981	9.810	-40.133	-27.328	-0.465

982	9.820	-40.406	-27.332	-0.462
983	9.830	-40.679	-27.337	-0.459
984	9.840	-40.953	-27.342	-0.455
985	9.850	-41.226	-27.346	-0.452
986	9.860	-41.500	-27.351	-0.449
987	9.870	-41.773	-27.355	-0.446
988	9.880	-42.047	-27.360	-0.443
989	9.890	-42.320	-27.364	-0.440
990	9.900	-42.594	-27.369	-0.437
991	9.910	-42.868	-27.373	-0.434
992	9.920	-43.141	-27.377	-0.431
993	9.930	-43.415	-27.382	-0.428
994	9.940	-43.689	-27.386	-0.425
995	9.950	-43.963	-27.390	-0.422
996	9.960	-44.237	-27.394	-0.419
997	9.970	-44.511	-27.399	-0.417
998	9.980	-44.785	-27.403	-0.414
999	9.990	-45.059	-27.407	-0.411
1000	10.000	-45.333	-27.411	-0.408
1001	10.010	-45.607	-27.415	-0.405
1002	10.020	-45.881	-27.419	-0.402
1003	10.030	-46.155	-27.423	-0.400
1004	10.040	-46.429	-27.427	-0.397
1005	10.050	-46.704	-27.431	-0.394
1006	10.060	-46.978	-27.435	-0.392
1007	10.070	-47.252	-27.439	-0.389
1008	10.080	-47.527	-27.443	-0.386
1009	10.090	-47.801	-27.447	-0.384
1010	10.100	-48.076	-27.450	-0.381
1011	10.110	-48.350	-27.454	-0.378
1012	10.120	-48.625	-27.458	-0.376
1013	10.130	-48.899	-27.462	-0.373
1014	10.140	-49.174	-27.466	-0.371
1015	10.150	-49.448	-27.469	-0.368
1016	10.160	-49.723	-27.473	-0.365
1017	10.170	-49.998	-27.477	-0.363
1018	10.180	-50.273	-27.480	-0.360
1019	10.190	-50.547	-27.484	-0.358
1020	10.200	-50.822	-27.487	-0.356
1021	10.210	-51.097	-27.491	-0.353
1022	10.220	-51.372	-27.495	-0.351
1023	10.230	-51.647	-27.498	-0.348
1024	10.240	-51.922	-27.501	-0.346
1025	10.250	-52.197	-27.505	-0.343
1026	10.260	-52.472	-27.508	-0.341
1027	10.270	-52.747	-27.512	-0.339
1028	10.280	-53.022	-27.515	-0.336
1029	10.290	-53.297	-27.519	-0.334
1030	10.300	-53.573	-27.522	-0.332
1031	10.310	-53.848	-27.525	-0.330
1032	10.320	-54.123	-27.529	-0.327
1033	10.330	-54.398	-27.532	-0.325
1034	10.340	-54.674	-27.535	-0.323
1035	10.350	-54.949	-27.538	-0.321
1036	10.360	-55.224	-27.541	-0.318
1037	10.370	-55.500	-27.545	-0.316
1038	10.380	-55.775	-27.548	-0.314

1039	10.390	-56.051	-27.551	-0.312
1040	10.400	-56.326	-27.554	-0.310
1041	10.410	-56.602	-27.557	-0.308
1042	10.420	-56.877	-27.560	-0.305
1043	10.430	-57.153	-27.563	-0.303
1044	10.440	-57.429	-27.566	-0.301
1045	10.450	-57.704	-27.569	-0.299
1046	10.460	-57.980	-27.572	-0.297
1047	10.470	-58.256	-27.575	-0.295
1048	10.480	-58.531	-27.578	-0.293
1049	10.490	-58.807	-27.581	-0.291
1050	10.500	-59.083	-27.584	-0.289
1051	10.510	-59.359	-27.587	-0.287
1052	10.520	-59.635	-27.590	-0.285
1053	10.530	-59.911	-27.593	-0.283
1054	10.540	-60.187	-27.596	-0.281
1055	10.550	-60.463	-27.598	-0.279
1056	10.560	-60.738	-27.601	-0.277
1057	10.570	-61.015	-27.604	-0.275
1058	10.580	-61.291	-27.607	-0.273
1059	10.590	-61.567	-27.609	-0.272
1060	10.600	-61.843	-27.612	-0.270
1061	10.610	-62.119	-27.615	-0.268
1062	10.620	-62.395	-27.617	-0.266
1063	10.630	-62.671	-27.620	-0.264
1064	10.640	-62.947	-27.623	-0.262
1065	10.650	-63.224	-27.625	-0.260
1066	10.660	-63.500	-27.628	-0.259
1067	10.670	-63.776	-27.631	-0.257
1068	10.680	-64.052	-27.633	-0.255
1069	10.690	-64.329	-27.636	-0.253
1070	10.700	-64.605	-27.638	-0.252
1071	10.710	-64.881	-27.641	-0.250
1072	10.720	-65.158	-27.643	-0.248
1073	10.730	-65.434	-27.646	-0.246
1074	10.740	-65.711	-27.648	-0.245
1075	10.750	-65.987	-27.651	-0.243
1076	10.760	-66.264	-27.653	-0.241
1077	10.770	-66.540	-27.655	-0.240
1078	10.780	-66.817	-27.658	-0.238
1079	10.790	-67.093	-27.660	-0.236
1080	10.800	-67.370	-27.663	-0.235
1081	10.810	-67.647	-27.665	-0.233
1082	10.820	-67.923	-27.667	-0.231
1083	10.830	-68.200	-27.670	-0.230
1084	10.840	-68.477	-27.672	-0.228
1085	10.850	-68.753	-27.674	-0.227
1086	10.860	-69.030	-27.676	-0.225
1087	10.870	-69.307	-27.679	-0.224
1088	10.880	-69.584	-27.681	-0.222
1089	10.890	-69.861	-27.683	-0.221
1090	10.900	-70.137	-27.685	-0.219
1091	10.910	-70.414	-27.688	-0.217
1092	10.920	-70.691	-27.690	-0.216
1093	10.930	-70.968	-27.692	-0.214
1094	10.940	-71.245	-27.694	-0.213
1095	10.950	-71.522	-27.696	-0.212

1096	10.960	-71.799	-27.698	-0.210
1097	10.970	-72.076	-27.700	-0.209
1098	10.980	-72.353	-27.702	-0.207
1099	10.990	-72.630	-27.705	-0.206
1100	11.000	-72.907	-27.707	-0.204
1101	11.010	-73.184	-27.709	-0.203
1102	11.020	-73.461	-27.711	-0.201
1103	11.030	-73.738	-27.713	-0.200
1104	11.040	-74.015	-27.715	-0.199
1105	11.050	-74.292	-27.717	-0.197
1106	11.060	-74.570	-27.719	-0.196
1107	11.070	-74.847	-27.721	-0.195
1108	11.080	-75.124	-27.723	-0.193
1109	11.090	-75.401	-27.725	-0.192
1110	11.100	-75.678	-27.726	-0.191
1111	11.110	-75.956	-27.728	-0.189
1112	11.120	-76.233	-27.730	-0.188
1113	11.130	-76.510	-27.732	-0.187
1114	11.140	-76.788	-27.734	-0.185
1115	11.150	-77.065	-27.736	-0.184
1116	11.160	-77.342	-27.738	-0.183
1117	11.170	-77.620	-27.739	-0.182
1118	11.180	-77.897	-27.741	-0.180
1119	11.190	-78.174	-27.743	-0.179
1120	11.200	-78.452	-27.745	-0.178