Plot Title: Library 312

#	Date Time, GMT-07:00	CO2, ppm (LGR S/N: 97899	Host Connected (LGR S/N: 9	Stopped (LGR S/N: 9	End Of File (LGR S/N: 9789942)
1	4/1/2016 11:41	654.5			
2	4/1/2016 11:42	682.5			
3	4/1/2016 11:43	636.1			
4	4/1/2016 11:44	406			
5	4/1/2016 11:45	402.9			
6	4/1/2016 11:46	409.6			
7	4/1/2016 11:47	382.2			
8	4/1/2016 11:48	385.8			
9	4/1/2016 11:49	378.5			
10	4/1/2016 11:50	386.4			
11	4/1/2016 11:51	449.9			
12	4/1/2016 11:52	544.6			
13	4/1/2016 11:53	562.3			
14	4/1/2016 11:54	550.7			
15	4/1/2016 11:55	557.4			
16	4/1/2016 11:56	573.3			
17	4/1/2016 11:57	617.8			
18	4/1/2016 11:58	623.3			
19	4/1/2016 11:59	640.4			
20	4/1/2016 12:00	641			
21	4/1/2016 12:01	642.9			
22	4/1/2016 12:02	659.3			
23	4/1/2016 12:03	670.9			
24	4/1/2016 12:04	683.8			
25	4/1/2016 12:05	700.9			
26	4/1/2016 12:06	710.6			
27	4/1/2016 12:07	679.5			
28	4/1/2016 12:08	704.5			
29	4/1/2016 12:09	703.3			
30	4/1/2016 12:10	711.2			
31	4/1/2016 12:11	734.4			
32	4/1/2016 12:12	744.2			
33	4/1/2016 12:13	733.8			
34	4/1/2016 12:14	728.3			

35	4/1/2016 12:15	766.8
36	4/1/2016 12:16	768
37	4/1/2016 12:17	774.7
38	4/1/2016 12:18	735.7
39	4/1/2016 12:19	736.9
40	4/1/2016 12:20	772.9
41	4/1/2016 12:21	735.7
42	4/1/2016 12:22	727.7
43	4/1/2016 12:23	747.3
44	4/1/2016 12:24	721.6
45	4/1/2016 12:25	703.3
46	4/1/2016 12:26	701.5
47	4/1/2016 12:27	706.3
48	4/1/2016 12:28	701.5
49	4/1/2016 12:29	694.7
50	4/1/2016 12:30	658.7
51	4/1/2016 12:31	667.9
52	4/1/2016 12:32	660
53	4/1/2016 12:33	641
54	4/1/2016 12:34	632.5
55	4/1/2016 12:35	619.7
56	4/1/2016 12:36	623.3
57	4/1/2016 12:37	638.6
58	4/1/2016 12:38	628.8
59	4/1/2016 12:39	605.6
60	4/1/2016 12:40	606.8
61	4/1/2016 12:41	580
62	4/1/2016 12:42	586.1
63	4/1/2016 12:43	586.1
64	4/1/2016 12:44	576.9
65	4/1/2016 12:45	580
66	4/1/2016 12:46	576.3
67	4/1/2016 12:47	569.6
68	4/1/2016 12:48	568.4
69	4/1/2016 12:49	553.7
70	4/1/2016 12:50	562.3

71	4/1/2016 12:51	555.6				
72	4/1/2016 12:52	561.7				
73	4/1/2016 12:53	551.3				
74	4/1/2016 12:54	541.5				
75	4/1/2016 12:55	553.7				
76	4/1/2016 12:56	553.1				
77	4/1/2016 12:57	543.3				
78	4/1/2016 12:58	529.3				
79	4/1/2016 12:59	584.2				
80	4/1/2016 13:00	559.8				
81	4/1/2016 13:01	428				
82	4/1/2016 13:02	404.8				
83	4/1/2016 13:03	434.1				
84	4/1/2016 13:04	366.9				
85	4/1/2016 13:05	389.5				
86	4/1/2016 13:05		Logged			
87	4/1/2016 13:06			Logged	Logged	

Jackson Keechler
ENGR 115
Lab 10 : 11 AM
4/1/2016

Input Parameters: (ppm)

Measured C outdoor	389.5
Assumed C outdoor	400
Correction Factor	10.5

Measurement	Date and Time	Hobo CO2 Concentration [ppm]	Actual CO2 Concentration [ppm]
39	4/1/2016 12:17	774.7	764.2
40	4/1/2016 12:18	735.7	725.2
41	4/1/2016 12:19	736.9	726.4
42	4/1/2016 12:20	772.9	762.4
43	4/1/2016 12:21	735.7	725.2
44	4/1/2016 12:22	727.7	717.2
45	4/1/2016 12:23	747.3	736.8
46	4/1/2016 12:24	721.6	711.1
47	4/1/2016 12:25	703.3	692.8
48	4/1/2016 12:26	701.5	691
49	4/1/2016 12:27	706.3	695.8
50	4/1/2016 12:28	701.5	691
51	4/1/2016 12:29	694.7	684.2
52	4/1/2016 12:30	658.7	648.2
53	4/1/2016 12:31	667.9	657.4
54	4/1/2016 12:32	660	649.5
55	4/1/2016 12:33	641	630.5
56	4/1/2016 12:34	632.5	622
57	4/1/2016 12:35	619.7	609.2
58	4/1/2016 12:36	623.3	612.8
59	4/1/2016 12:37	638.6	628.1
60	4/1/2016 12:38	628.8	618.3
61	4/1/2016 12:39	605.6	595.1
62	4/1/2016 12:40	606.8	596.3
63	4/1/2016 12:41	580	569.5
64	4/1/2016 12:42	586.1	575.6
65	4/1/2016 12:43	586.1	575.6
67	4/1/2016 12:44	576.9	566.4
68	4/1/2016 12:45	580	569.5
69	4/1/2016 12:46	576.3	565.8
70	4/1/2016 12:47	569.6	559.1
71	4/1/2016 12:48	568.4	557.9
72	4/1/2016 12:49	553.7	543.2
73	4/1/2016 12:50	562.3	551.8
74	4/1/2016 12:51	555.6	545.1
75	4/1/2016 12:52	561.7	551.2
76	4/1/2016 12:53	551.3	540.8
77	4/1/2016 12:54	541.5	531
78	4/1/2016 12:55	553.7	543.2
79	4/1/2016 12:56	553.1	542.6
80	4/1/2016 12:57	543.3	532.8
81	4/1/2016 12:58	529.3	518.8
82	4/1/2016 12:59	584.2	573.7
83	4/1/2016 13:00	559.8	549.3
84	4/1/2016 13:01	428	417.5
85	4/1/2016 13:02	404.8	394.3
86	4/1/2016 13:03	434.1	423.6
87	4/1/2016 13:04	366.9	356.4
88	4/1/2016 13:05	389.5	379

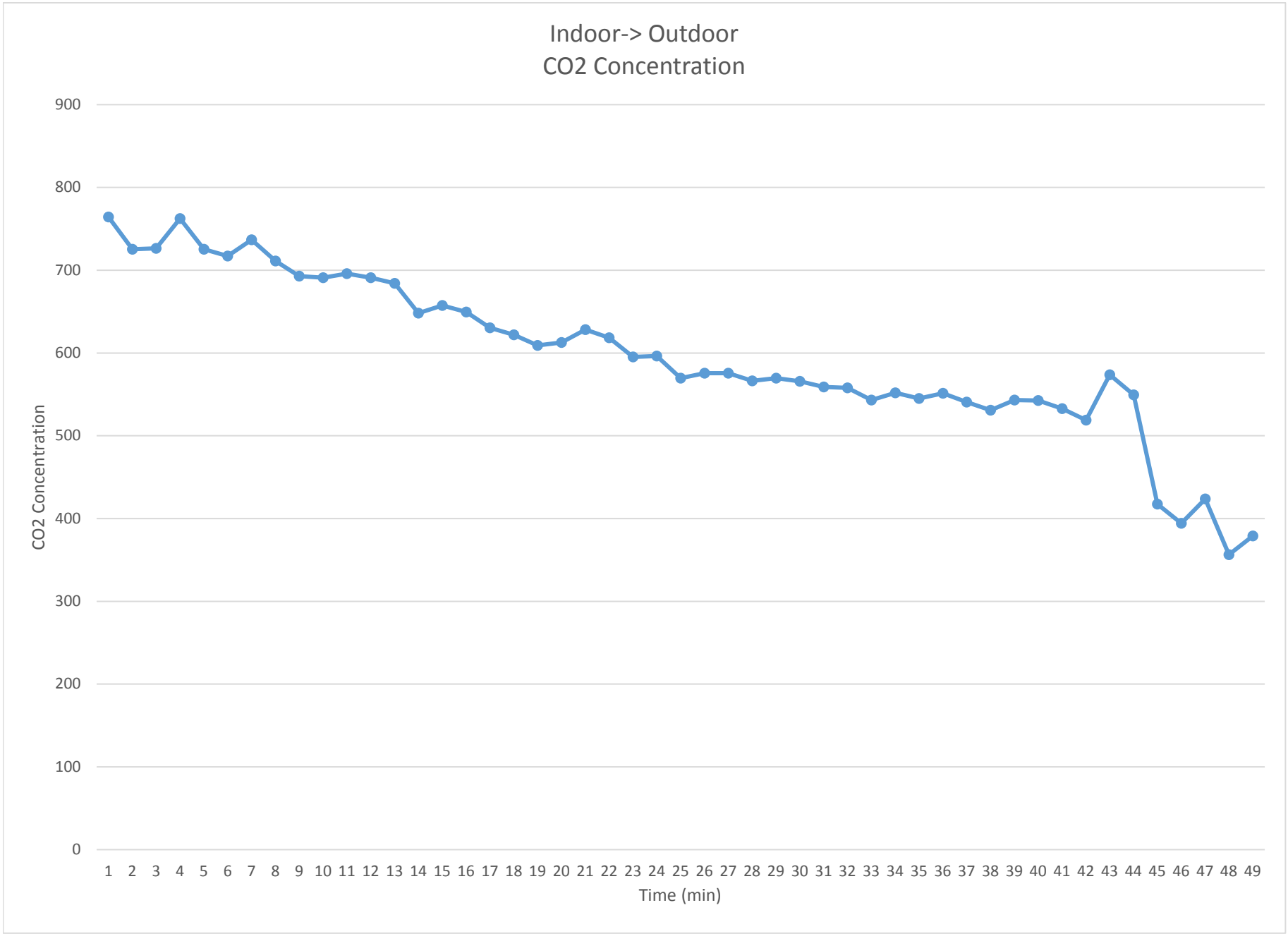
Volume Measurements(ft^3)
2194.5 ft^3

Average Equ. Based on Actual CO2 Concentration.
Concentration(final)-Concentration(inital) =
Ave. slope of -385.2 = m

y=-385.2x+696.7

^ resulting in a secant slope from graph

For estimation of Actual CO2 Concentration values:
Hobo Concentration= H
Y=H-Correction Factor

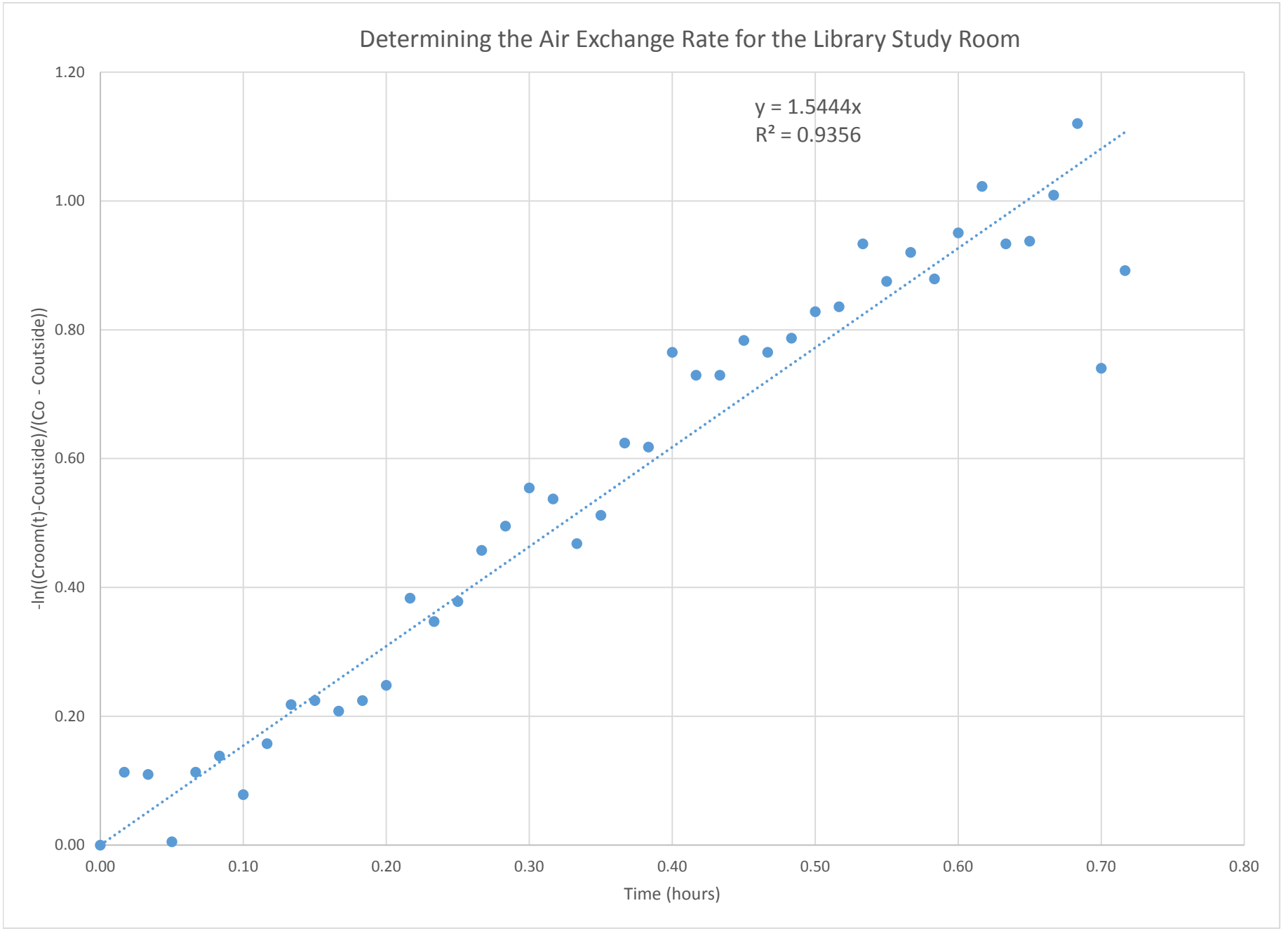

Indoor-> Outdoor
CO2 Concentration
CO2 Concentration
900
800
700
600
500
400
300
200
100
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
Time (min)

Jackson Keechler
ENGR 115
April 8 2016

Input Parameters:	
Measured C outdoor (ppm)	389.5
Assumed C outdoor (ppm)	400
Correction Factor:	10.5
Room Volume (ft^3) :	2194.5
Room Capacity:	6

Calculations:	
Air Exchange Rate (1hr)	1.54
Time to remove an non-reactive (hrs)	1.942501943
Ventilation Rate: (ft^3/min*person)	9.414405

Time (min.)	Date and Time	Hobo CO2 Concentration [ppm]	Actual CO2 Concentration [ppm]	Experiment time (hr)	natural log function
0	4/1/2016 12:17	774.7	764.2	0.00	0.00
1	4/1/2016 12:18	735.7	725.2	0.02	0.11
2	4/1/2016 12:19	736.9	726.4	0.03	0.11
3	4/1/2016 12:20	772.9	762.4	0.05	0.00
4	4/1/2016 12:21	735.7	725.2	0.07	0.11
5	4/1/2016 12:22	727.7	717.2	0.08	0.14
6	4/1/2016 12:23	747.3	736.8	0.10	0.08
7	4/1/2016 12:24	721.6	711.1	0.12	0.16
8	4/1/2016 12:25	703.3	692.8	0.13	0.22
9	4/1/2016 12:26	701.5	691	0.15	0.22
10	4/1/2016 12:27	706.3	695.8	0.17	0.21
11	4/1/2016 12:28	701.5	691	0.18	0.22
12	4/1/2016 12:29	694.7	684.2	0.20	0.25
13	4/1/2016 12:30	658.7	648.2	0.22	0.38
14	4/1/2016 12:31	667.9	657.4	0.23	0.35
15	4/1/2016 12:32	660	649.5	0.25	0.38
16	4/1/2016 12:33	641	630.5	0.27	0.46
17	4/1/2016 12:34	632.5	622	0.28	0.50
18	4/1/2016 12:35	619.7	609.2	0.30	0.55
19	4/1/2016 12:36	623.3	612.8	0.32	0.54
20	4/1/2016 12:37	638.6	628.1	0.33	0.47
21	4/1/2016 12:38	628.8	618.3	0.35	0.51
22	4/1/2016 12:39	605.6	595.1	0.37	0.62
23	4/1/2016 12:40	606.8	596.3	0.38	0.62
24	4/1/2016 12:41	580	569.5	0.40	0.76
25	4/1/2016 12:42	586.1	575.6	0.42	0.73
26	4/1/2016 12:43	586.1	575.6	0.43	0.73
27	4/1/2016 12:44	576.9	566.4	0.45	0.78
28	4/1/2016 12:45	580	569.5	0.47	0.76
29	4/1/2016 12:46	576.3	565.8	0.48	0.79
30	4/1/2016 12:47	569.6	559.1	0.50	0.83
31	4/1/2016 12:48	568.4	557.9	0.52	0.84
32	4/1/2016 12:49	553.7	543.2	0.53	0.93
33	4/1/2016 12:50	562.3	551.8	0.55	0.88
34	4/1/2016 12:51	555.6	545.1	0.57	0.92
35	4/1/2016 12:52	561.7	551.2	0.58	0.88
36	4/1/2016 12:53	551.3	540.8	0.60	0.95
37	4/1/2016 12:54	541.5	531	0.62	1.02
38	4/1/2016 12:55	553.7	543.2	0.63	0.93
39	4/1/2016 12:56	553.1	542.6	0.65	0.94
40	4/1/2016 12:57	543.3	532.8	0.67	1.01
41	4/1/2016 12:58	529.3	518.8	0.68	1.12
42	4/1/2016 12:59	584.2	573.7	0.70	0.74
43	4/1/2016 13:00	559.8	549.3	0.72	0.89
44	4/1/2016 13:01	428	417.5	0.73	3.04
45	4/1/2016 13:02	404.8	394.3	0.75	
46	4/1/2016 13:03	434.1	423.6	0.77	
47	4/1/2016 13:04	366.9	356.4	0.78	
48	4/1/2016 13:05	389.5	379	0.80	


Determining the Air Exchange Rate for the Library Study Room
y = 1.5444x
R² = 0.9356
-ln((Croom(t)-Coutside)/(Co - Coutside))
Time (hours)
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.80

Questions:	Answer:
What is the air exchange rate (λ) of the room you tested? (Be sure to include the units for the air exchange rate in your answer)	The air exchange rate of the library room we tested; equalled out to be 1.5444 /hour.
In general it takes 3/λ hours to remove a non-reactive chemical from indoor air. Based on this time, what recommendations would you make to the occupants of the room?	Since the air is removed from the room in 1.94 hours, I recommend the 6 people leave the room in that time (under 2 hours). To prevent accidental affixiation.
Compare your ventilation rate for a typical number of occupants to the ASHRAE recommended ventilation rate. Based on this comparison, are the occupants wasting energy heating and cooling the air or are the occupants being too cheap and not supplying enough air? Justify your answer.	The ASHRAE standard is 15 ft^3/min.*person, and our calculated Ventilation Rate was 9.41. From the difference of 5.59, our occupants are being cheap and not supplying enough air.
Given the ASHRAE standard ventilation standard, what is the maximum number of people you would recommend having in this room at one time? Use your model to determine this number.	From the Standard ASHRAE and my model, the range of people should fall between 5-10 people at a time. Since those values provide a safe median for the standard of values.