

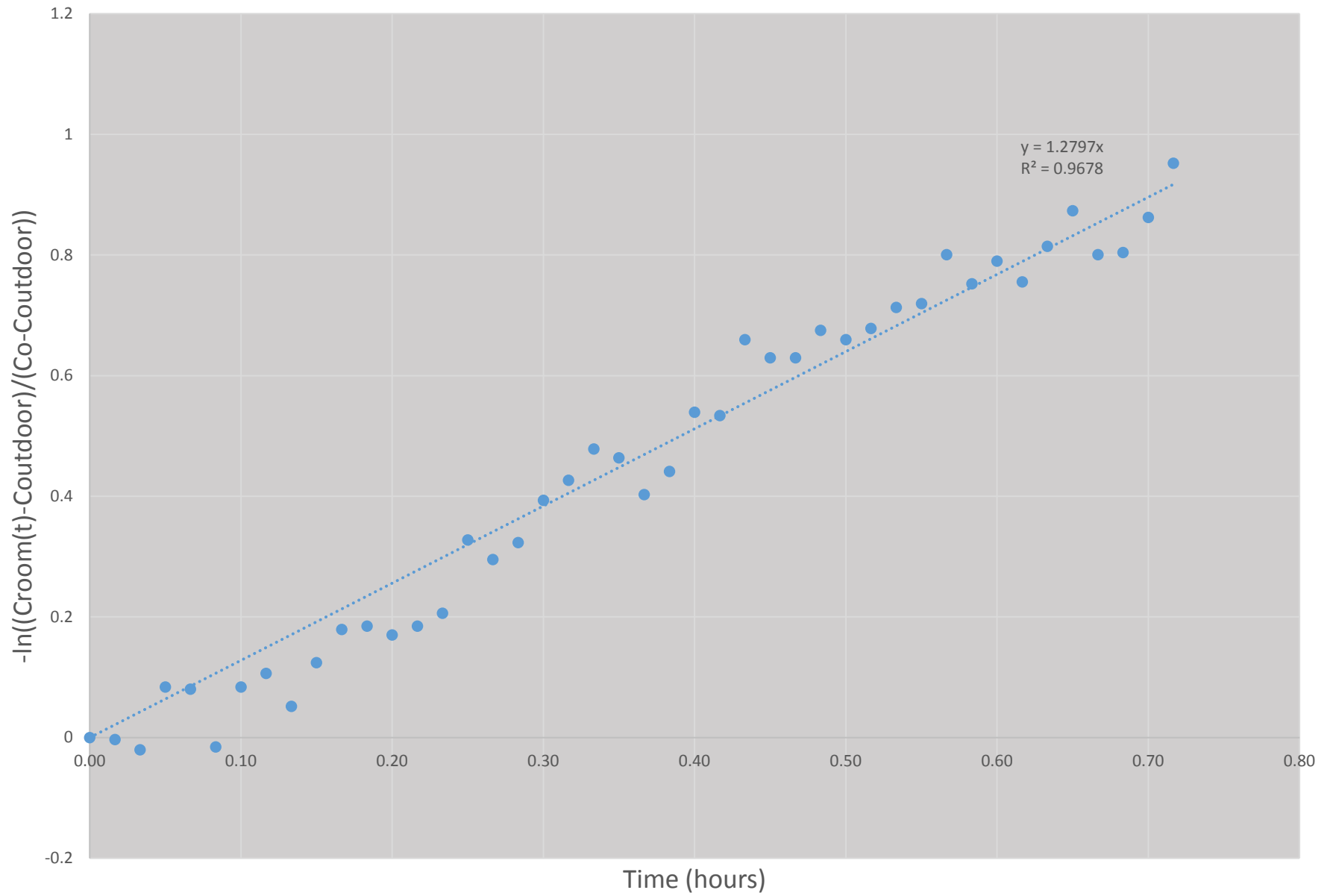
Jenna Davey
ENGR 115
Lab Section F 11-2
4/8/2016

Input Parameters	
Measured Coutdoor (ppm)	380
Assumed Coutdoor (ppm)	400
Correction Factor (ppm)	20
Room Volume (ft^3)	2194.5
Room Capacity (people)	6

Calculations	
Air Exchange Rate (1/hr)	1.2797
Time to remove a non-reactive chemical (hr)	2.344299445
Ventilation Rate (ft^3/minute/person)	7.800837917

Analysis					
Measurement (minutes)	Date and Time	Hobo CO2 Concentration	Actual CO2 Concentration (ppm)	Experiment Time (hr)	In Function
0	4/1/2016 12:15:00	766.8	786.8	0.00	0
1	4/1/2016 12:16:00	768	788	0.02	-0.003097576
2	4/1/2016 12:17:00	774.7	794.7	0.03	-0.020218219
3	4/1/2016 12:18:00	735.7	755.7	0.05	0.083820085
4	4/1/2016 12:19:00	736.9	756.9	0.07	0.080452133
5	4/1/2016 12:20:00	772.9	792.9	0.08	-0.015647363
6	4/1/2016 12:21:00	735.7	755.7	0.10	0.083820085
7	4/1/2016 12:22:00	727.7	747.7	0.12	0.106567725
8	4/1/2016 12:23:00	747.3	767.3	0.13	0.051728811
9	4/1/2016 12:24:00	721.6	741.6	0.15	0.124267302
10	4/1/2016 12:25:00	703.3	723.3	0.17	0.179327079
11	4/1/2016 12:26:00	701.5	721.5	0.18	0.18491022
12	4/1/2016 12:27:00	706.3	726.3	0.20	0.17009056
13	4/1/2016 12:28:00	701.5	721.5	0.22	0.18491022
14	4/1/2016 12:29:00	694.7	714.7	0.23	0.20628796
15	4/1/2016 12:30:00	658.7	678.7	0.25	0.327771829
16	4/1/2016 12:31:00	667.9	687.9	0.27	0.295294566
17	4/1/2016 12:32:00	660	680	0.28	0.32311816
18	4/1/2016 12:33:00	641	661	0.30	0.393387356
19	4/1/2016 12:34:00	632.5	652.5	0.32	0.426496515
20	4/1/2016 12:35:00	619.7	639.7	0.33	0.478519622
21	4/1/2016 12:36:00	623.3	643.3	0.35	0.463612514
22	4/1/2016 12:37:00	638.6	658.6	0.37	0.402625297
23	4/1/2016 12:38:00	628.8	648.8	0.38	0.441258403
24	4/1/2016 12:39:00	605.6	625.6	0.40	0.539144244
25	4/1/2016 12:40:00	606.8	626.8	0.42	0.533839192
26	4/1/2016 12:41:00	580	600	0.43	0.659590397
27	4/1/2016 12:42:00	586.1	606.1	0.45	0.629546276
28	4/1/2016 12:43:00	586.1	606.1	0.47	0.629546276
29	4/1/2016 12:44:00	576.9	596.9	0.48	0.675211778
30	4/1/2016 12:45:00	580	600	0.50	0.659590397
31	4/1/2016 12:46:00	576.3	596.3	0.52	0.678263662
32	4/1/2016 12:47:00	569.6	589.6	0.53	0.712991174
33	4/1/2016 12:48:00	568.4	588.4	0.55	0.719340401
34	4/1/2016 12:49:00	553.7	573.7	0.57	0.80057809
35	4/1/2016 12:50:00	562.3	582.3	0.58	0.752254082
36	4/1/2016 12:51:00	555.6	575.6	0.60	0.789699082
37	4/1/2016 12:52:00	561.7	581.7	0.62	0.755550788
38	4/1/2016 12:53:00	551.3	571.3	0.63	0.814491358
39	4/1/2016 12:54:00	541.5	561.5	0.65	0.873402621
40	4/1/2016 12:55:00	553.7	573.7	0.67	0.80057809
41	4/1/2016 12:56:00	553.1	573.1	0.68	0.804038301
42	4/1/2016 12:57:00	543.3	563.3	0.70	0.862318764
43	4/1/2016 12:58:00	529.3	549.3	0.72	0.951950059

## Determining the Air Exchange Rate for the Library Study Room 312



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Questions	
What is the air exchange rate ( $\lambda$ ) 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 312 was 1.2797 per hour. This was determined from the graph that plotted the natural log function versus time in hours.
In general it takes $3/\lambda$ 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?	According to that equation, it would take 2.34 hours to remove CO <sub>2</sub> from the indoor air of Library Room 312. Based on this time, I would recommend that the occupants of the room not stay in there for too long: maybe two hours at most. And then avoid the room for a while, and let it air out. I would also recommend to not have an excess of people in the room all at once, as it could become dangerous.
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.	If the typical occupancy was to include 6 people, than the calculated ventilation rate would be 7.8 cubic feet per minute per person. Compared to the ASHRAE's standard of 15 cubic feet per minute per person, this rate is not great. The occupants are most likely being too cheap with their air and ventilation, as providing more would increase the ventilation rate, thereby making the room safer and more closely comparable to ASHRAE's standard.
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.	Given ASHRAE's standard, the maximum number of people I would recommend having in this room at one time is 3 occupants. When calculating the air exchange rate with this many people instead of 6, the answer is 15.6 cubic feet per minute per person. This is a much healthier and safer rate than the one calculated with 6 people.