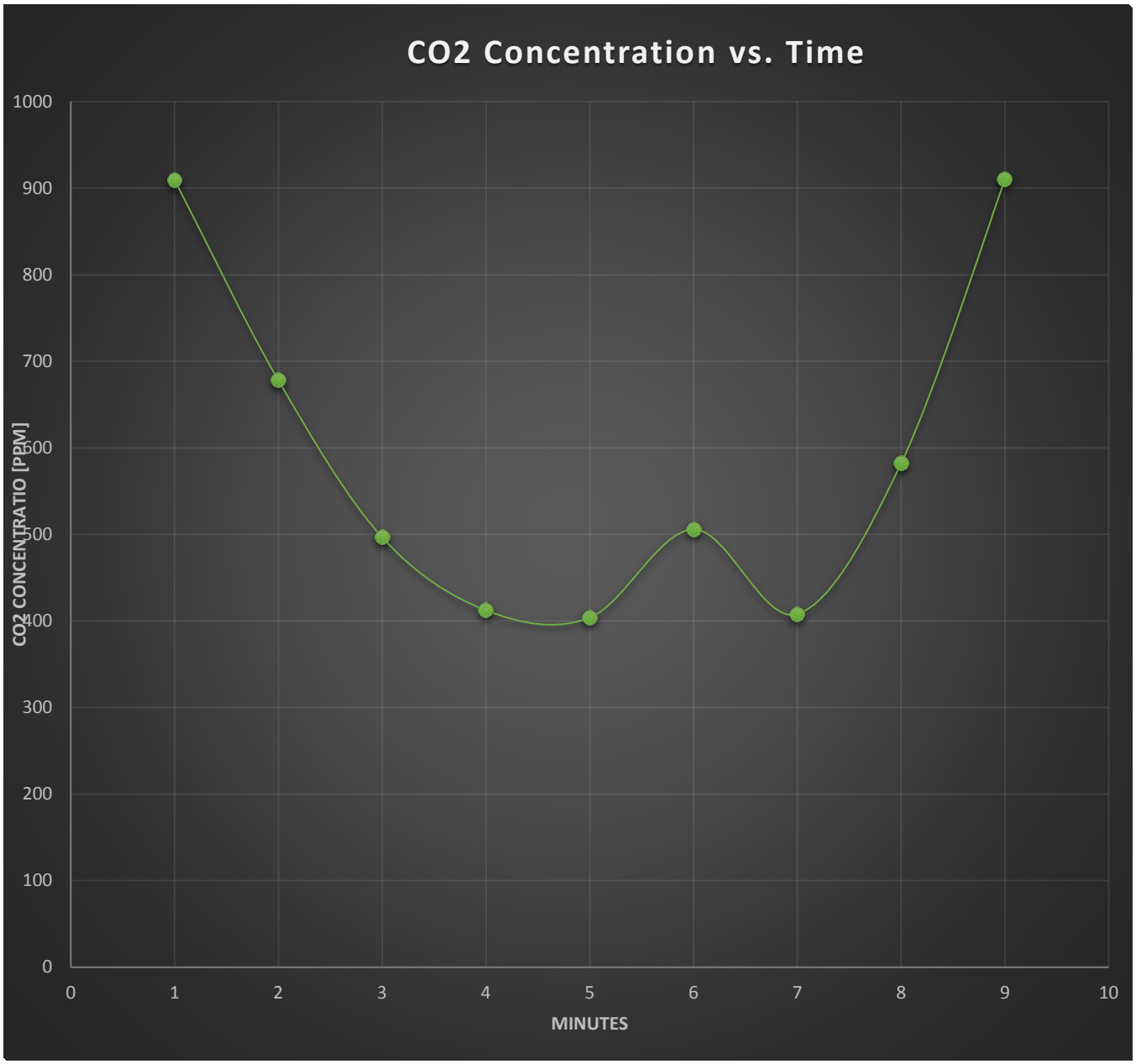
Luke Annandale
ENGR 115
Thursday; 10-20-2016

Input Parameters:	
Measured Coutdoor [ppm]	
	434
Assumed Coutdoor [ppm]	
	400
Correction Factor [ppm]	
	40
Room Volume (ft3)	
	1485
Room Capacity (people)	
	5

Calculations:	
Air Exchange Rate (1/hr)	
	0.2431
Ventilation rate (ft3/min/people)	
	1.20
Time to remove non-reactive chemical	
	12.34

Analysis:

Measurement (min)	Date and Time	Hobo CO2 Concentration	Actual CO2 Concentration [ppm]
1	10/20/2016 14:45	869.4	909.4
2	10/20/2016 14:46	638	678
3	10/20/2016 14:47	456.7	496.7
4	10/20/2016 14:48	372.4	412.4
5	10/20/2016 14:49	363.9	403.9
6	10/20/2016 14:50	465.8	505.8
7	10/20/2016 14:51	368.1	408.1
8	10/20/2016 14:52	542.1	582.1
9	10/20/2016 14:53	870	910


CO2 Concentration vs. Time
1000
900
800
700
600
500
400
300
200
100
0
CO2 CONCENTRATIO [PPM]
0
1
2
3
4
5
6
7
8
9
10
MINUTES

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Calculations:	
Air Exchange Rate (1/hr)	
	0.2431
Ventilation rate (ft3/min/people)	
	1.20
Time to remove non-reactive chemical (hrs)	
	12.34

Analysis:

Measurement (min)	Date and Time	Hobo CO2 Concentration	Actual CO2 Concentration [ppm]	Experiment Time (hr)	"-LN(Croom(t)-Coutdoor)/(CO-Coutdoor)
0	10/20/2016 15:09	1482.3	1522.3	0.000	0.000
1	10/20/2016 15:10	1448.1	1488.1	0.017	0.031
2	10/20/2016 15:11	1416.4	1456.4	0.033	0.061
3	10/20/2016 15:12	1403.5	1443.5	0.050	0.073
4	10/20/2016 15:13	1400.5	1440.5	0.067	0.076
5	10/20/2016 15:14	1403.5	1443.5	0.083	0.073
6	10/20/2016 15:15	1404.2	1444.2	0.100	0.072
7	10/20/2016 15:16	1406.6	1446.6	0.117	0.070
8	10/20/2016 15:17	1417.6	1457.6	0.133	0.059
9	10/20/2016 15:18	1407.8	1447.8	0.150	0.069
10	10/20/2016 15:19	1417.6	1457.6	0.167	0.059
11	10/20/2016 15:20	1416.4	1456.4	0.183	0.061
12	10/20/2016 15:21	1418.8	1458.8	0.200	0.058
13	10/20/2016 15:22	1406.6	1446.6	0.217	0.070
14	10/20/2016 15:23	1408.4	1448.4	0.233	0.068
15	10/20/2016 15:24	1406.6	1446.6	0.250	0.070
16	10/20/2016 15:25	1400.5	1440.5	0.267	0.076
17	10/20/2016 15:26	1391.3	1431.3	0.283	0.085
18	10/20/2016 15:27	1390.7	1430.7	0.300	0.085
19	10/20/2016 15:28	1380.3	1420.3	0.317	0.095
20	10/20/2016 15:29	1377.3	1417.3	0.333	0.098
21	10/20/2016 15:30	1386.4	1426.4	0.350	0.089
22	10/20/2016 15:31	1386.4	1426.4	0.367	0.089
23	10/20/2016 15:32	1370.6	1410.6	0.383	0.105
24	10/20/2016 15:33	1372.4	1412.4	0.400	0.103
25	10/20/2016 15:34	1380.3	1420.3	0.417	0.095
26	10/20/2016 15:35	1392.6	1432.6	0.433	0.083
27	10/20/2016 15:36	1393.8	1433.8	0.450	0.082
28	10/20/2016 15:37	1387.7	1427.7	0.467	0.088
29	10/20/2016 15:38	1384	1424	0.483	0.092
30	10/20/2016 15:39	1381.6	1421.6	0.500	0.094
31	10/20/2016 15:40	1382.2	1422.2	0.517	0.093

1.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 that I measured was about 0.2431/hour

2.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?

I would suggest that they leave the room and and allow it to ventilate before entering again. If possible, they should open the windows and possibly turn on a ventilation system if one has been installed within that room. In the the measurements given from my results, it would be best to not enter the room for approximately 12 hours to allow the non-reactive chemical to be fully removed, but this number will obviously vary depending on the size of the room and the amount of people in it.

3.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 occupants are not supplying enough air into this room. While conducting this experiment I noticed that the room we were in had no windows and only a very small vent tucked away in the corner with no way of controlling the ventilation coming through it. This means that the occupants are being extremely cheap and also risking the levels of CO2 that will build up in that room if the door is not kept open to allow it to ventilate.

4.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.

I would suggest that if anyone were to be in this room, the maximum amount of people that would be safe would have to be less than 2 people at a time. Since the venitlation rate is so low, at 1.203345, it would be unsafe to have any more people than that in the room.