

CS 475

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Project 3

1. What your own-choice quantity was and how it fits into the simulation.

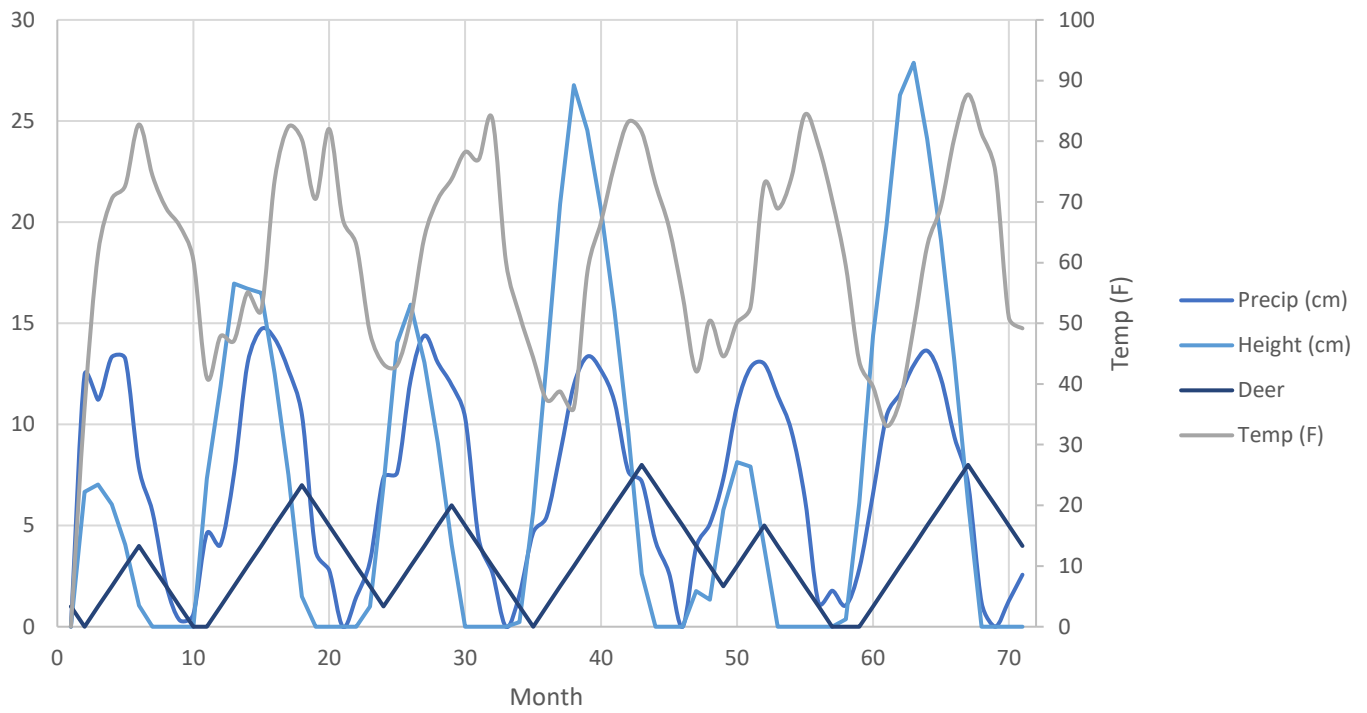
I chose to add in relative humidity as an extra variable. This variable is based off how much it rains and what the temperature is. The relative humidity affects the production of grains since the grains will not grow as high if the humidity is not in the correct range. The relative humidity can be seen to rise when temperatures are lower and fall once temperatures start to rise. The humidity that is ideal for growing oats is around 20%, and this simulation has the optimal grow range to be around that percentage. When the relative humidity is in the idea range, the grains will have a multiplier added to them, the longer the humidity is idea, the taller the plant can grow. The opposite is true for poor conditions, where the plant cannot grow as high with poor grow conditions. Grains also don't like to grow in cold weather, so if the temperature falls below freezing, the height is also reduced significantly.

2. A table showing values for temperature, precipitation, number of deer, height of the grain, and your own-choice quantity as a function of month number.

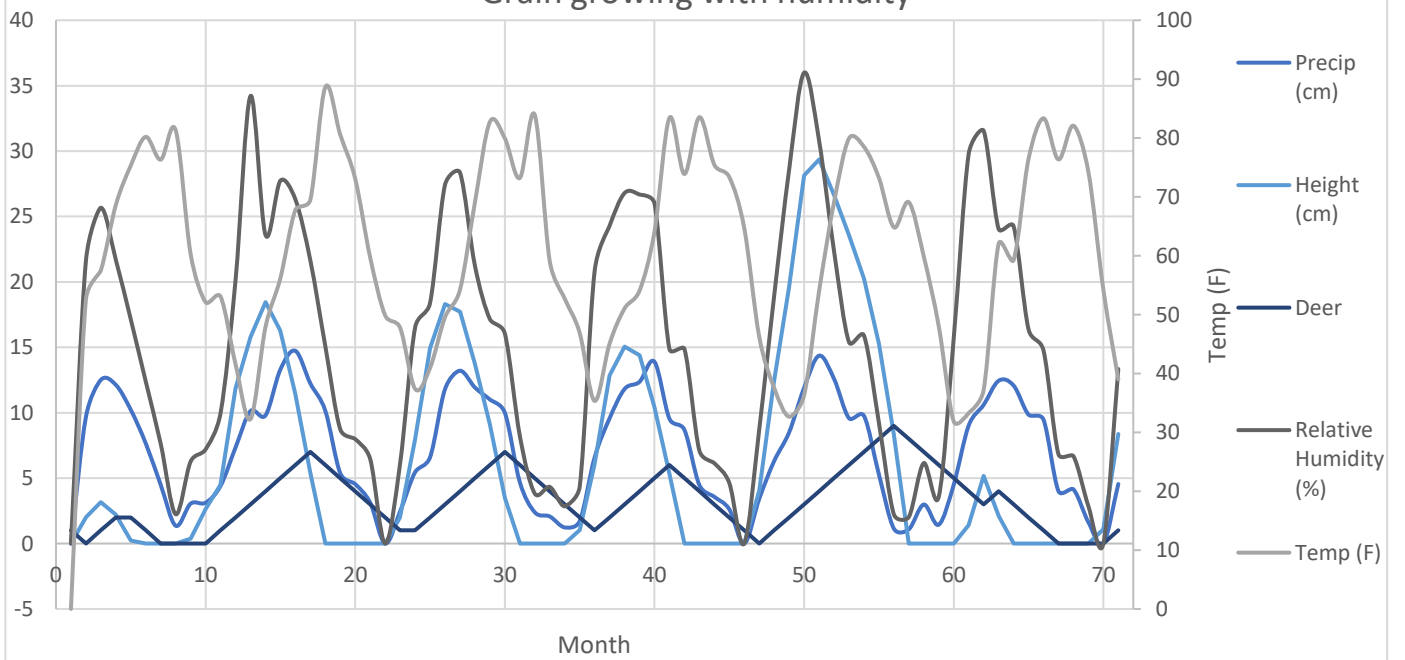
Tables are below.

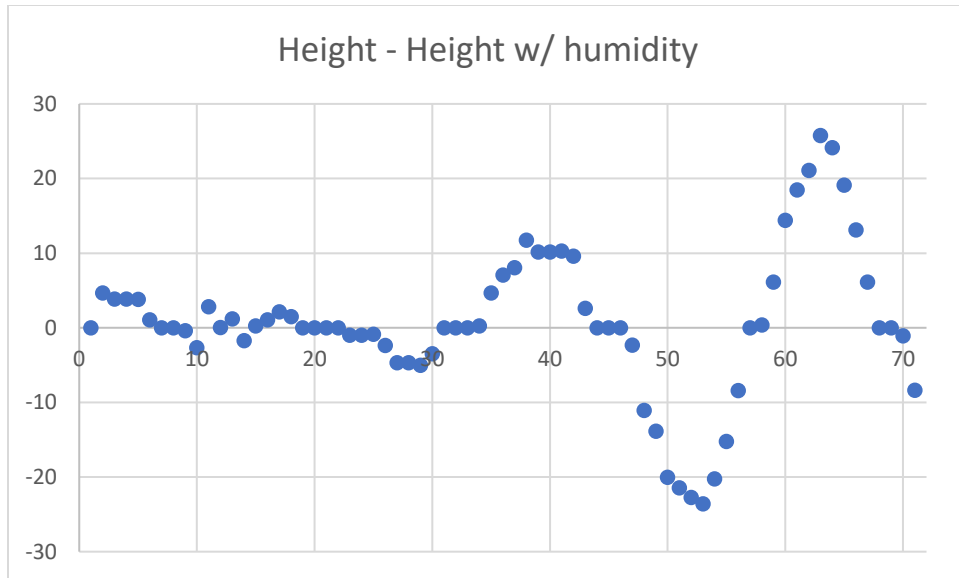
3. A graph showing temperature, precipitation, number of deer, height of the grain, and your own-choice quantity as a function of month number. Note: if you change the units to °C and centimeters, the quantities might fit better on the same set of axes

Grain growing



Grain growing with humidity





4. A commentary about the patterns in the graph and why they turned out that way. What evidence in the curves proves that your own quantity is actually affecting the simulation correctly?

The first thing that should be expected is that the simulation should have some seasonality where there are temperature, deer population and grain growth drop. The chart with the added humidity factors does show changes over the original chart, the grains start growing sooner when relative humidity is added. At the end of the winter months, early spring months, relative humidity starts rising to the idea range; then, the humidity will get too high in the later months, causing the grain growth to slow down. This added variable makes the grain growth time longer than the original graph. There is also a time where the temperature falls below freezing, this causes the grains to not grow as much and it can be seen in the chart. There is an increase in the difference between the height without humidity and height with humidity as time goes on. This pattern could be due to the changing deer population since the grains are growing for a longer time when there is more humidity. Lastly, the deer population has a greater variance in the chart with added relative humidity. This could be due to grains having a longer growing period.

Precip (cm)	Temp (F)	Height (cm)	Deer	Relative Humidity (%)
0	0	0	1	0
9.67	52.55	2.02	0	21.6
12.51	57.52	3.17	1	25.67
12.13	68.62	2.22	2	21.69
10.22	75.32	0.23	2	17.13
7.66	80.19	0	1	12.39
4.48	76.32	0	0	7.62
1.36	81.32	0	0	2.24

3.05	60.27	0.38	0	6.27
3.12	52.11	2.66	0	7.2
4.41	53.05	4.48	1	9.98
7.34	41.59	11.85	2	20.12
10.13	32.25	15.79	3	34.21
9.79	47.84	18.44	4	23.6
13.31	56.21	16.27	5	27.74
14.73	67.78	11.42	6	26.31
12.24	69.5	5.38	7	21.65
10.15	88.64	0	6	15.09
5.37	80.54	0	5	8.73
4.54	73.06	0	4	7.98
3.12	59.69	0	3	6.46
0	49.87	0	2	0
2.46	47.77	1.99	1	6.13
5.45	37.38	7.94	1	16.5
6.59	40.94	14.94	2	18.38
11.8	49.57	18.31	3	27.42
13.21	54.19	17.73	4	28.36
11.93	69.05	13.76	5	21.24
11.01	82.74	9.11	6	17.15
10	79.94	3.48	7	16.05
4.69	73.2	0	6	8.23
2.39	83.91	0	5	3.82
2.07	59.08	0	4	4.33
1.23	52.72	0	3	2.84
1.71	46.9	1.03	2	4.33
6.58	35.34	6.06	1	20.82
9.57	45.06	12.84	2	24.29
11.81	51.04	15.06	3	26.79
12.36	54.06	14.4	4	26.68
13.89	64.09	10.46	5	26
9.54	83.42	5.34	6	14.86
8.69	73.88	0	5	14.88
4.47	83.53	0	4	7.1
3.57	75.45	0	3	6.14
2.62	73.36	0	2	4.63
0	64.69	0	1	0
3.42	46.25	4.08	0	8.71
6.31	37.55	12.42	1	18.94
8.5	32.65	19.61	2	28.58
11.9	36.3	28.15	3	35.99
14.36	53.98	29.36	4	30.8

12.59	69.08	26.66	5	22.35
9.58	79.93	23.6	6	15.4
9.76	78.51	20.25	7	15.9
5.28	73.24	15.24	8	9.23
1.14	64.82	8.41	9	2.23
1.09	69.09	0	8	2.03
2.98	59.86	0	7	6.15
1.44	48.03	0	6	3.58
4.49	31.87	0	5	15.69
9.02	33.28	1.4	4	29.78
10.6	37.2	5.18	3	31.55
12.44	62.01	2.12	4	24.05
12.08	59.25	0	3	24.26
9.85	76.45	0	2	16.37
9.47	83.35	0	1	14.76
4.01	76.35	0	0	6.83
4.14	82.09	0	0	6.68
1.63	74.26	0	0	2.86
0	54.24	1.09	0	0
4.55	38.99	8.37	1	13.34