Project #2 – Functional Decomposition

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

At the initial stage, the number of deer is 4, and the height of grain is 10. I chose the Zombie() function, which is Myagent() function, to reduce the number of deer, protecting the grain from being 0 for a long time. In the Zombie() function, the number of zombie starts from 0 and gradually increases when the number of deer is over 4 and a half number of the zombie. Each zombie eats one deer per a month, which is important to make the whole environment balanced. If there is no deer, the zombies will be dead. Then, the whole environment would circulate within well-balanced state.

2. **Data Table**

Month	Sum of Temp (C)	Sum of Precip (cm)	Sum of Height (cm)	Sum of Deer	Sum of Zombie
0	8.6	20.65	32.05	5	0
1	10.84	31.59	26.97	6	1
2	17.25	29.43	11.87	6	2
3	16.6	35.23	0	3	3
4	20.94	29.1	0	0	3
5	26.04	23.03	0	0	1
6	24.79	13.97	0	0	0
7	28.44	11.23	0	0	0
8	19.94	5.27	0.01	0	0
9	8.7	4.15	8.43	0	0
10	2.32	4.39	21.72	1	0
11	0.79	16.93	36.88	2	0
12	1.01	20.72	51.9	3	0
13	3.59	24.58	74.01	4	0
14	18.22	29.64	63.91	5	0

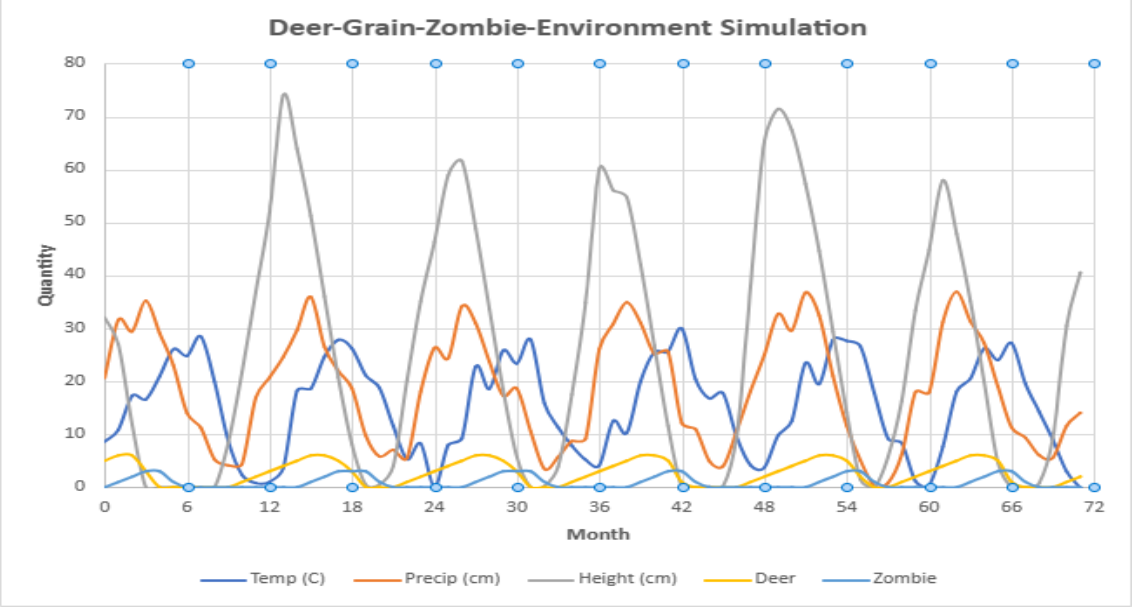
15	18.58	35.95	51.25	6	1
16	24.66	26.48	36.01	6	2
17	27.82	21.97	20.77	5	3
18	26.22	18.64	8.07	3	3
19	21.11	9.76	0.45	0	3
20	18.73	5.8	0.48	0	1
21	11.57	7.04	3.96	0	0
22	5.29	5.5	20.09	1	0
23	8.24	18.09	35.13	2	0
24	0.04	26.29	46.3	3	0
25	7.99	24.35	58.94	4	0
26	9.26	34.16	61.55	5	0
27	22.77	30.97	48.85	6	1
28	18.57	23.68	33.65	6	2
29	25.82	17.29	18.41	5	3
30	23.38	18.62	5.71	3	3
31	27.88	10.57	0	0	3
32	15.84	3.46	0.22	0	1
33	11.29	5.7	3.87	0	0
34	7.84	8.71	17.5	1	0
35	5.17	9.15	34.86	2	0
36	4.13	26.11	60.14	3	0
37	12.49	30.8	56.1	4	0
38	10.28	34.92	54.72	5	0
39	19.99	31.02	42.03	6	1
40	25.5	25.16	26.79	6	2
41	25.62	25.59	11.55	5	3
42	29.95	12.11	0	1	3
43	20.4	11	0	0	1
44	16.77	4.96	0.12	0	0
45	17.75	3.96	0.16	0	0
46	9.45	10.65	9.83	0	0
47	4.15	18.14	37.85	1	0
48	3.69	24.92	65.23	2	0
49	9.75	32.73	71.43	3	0
50	12.49	29.61	67.46	4	0
51	23.43	36.77	57.3	5	0
52	19.5	32.43	44.62	6	1
53	27.86	21.03	29.38	6	2
54	27.62	11.61	14.14	5	3
55	26.59	5.05	1.44	2	3
56	17.84	0.28	0	0	1
57	9.21	0.79	5.71	0	0
58	8.33	6.16	16.25	1	0

59	1.15	17.97	33.4	2	0
60	0.41	17.93	44.84	3	0
61	7.65	31.2	57.96	4	0
62	18.07	36.92	47.86	5	0
63	20.48	31.31	35.17	6	1
64	26.19	27.22	19.93	6	2
65	24	19	4.69	5	3
66	27.23	11.24	0	1	3
67	19.55	9.36	0	0	1
68	14.27	6.04	0.75	0	0
69	8.95	5.55	9.33	0	0
70	2.97	11.58	30.45	1	0
71	-0.15	14.05	40.52	2	0

< **Figure 1.** The data table of simulation >

Figure 1 shows the quantity of each category during six years. In the table, there are temperature, precipitation, height of grain, the number of deer, and the number of zombies in each month. As can be seen, the grain, deer, and zombies influence each other, making the whole environment stable.

3. Data Graph



< **Figure 2.** The data graph of simulation >

Figure 2 shows the graph of the data above. In this graph, the relationship among the grain, deer, and zombies is well-balanced, meaning that there are no entities being zero for a long time during six years.

4. **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?**

As shown in Figure 2, the patterns in the graph are repeated by the height of the grain, affecting the number of deer and zombies. After reaching the peak in the height of the grain, the number of deer is subsequently peak, causing to increase the zombie population. In the chart, we can guess the zombie population is depending on the number of deer. The zombies make the deer population decrease to prevent the grain growth from a long resting phase, which can be over 10 months (my first several attempts showed this trend because of the number of deer). The relationships between the grain and deer, the deer and zombies, the zombies and grain influence each other to control the number of each entity directly and indirectly.

When the deep population become 6, the zombie population increase gradually until the extinction of deer, providing the grain with the chance to grow. Then, the increase of the zombie population stops when there is no deer, and thus the number of zombies decrease like deer. After the zombies, the predators of deer, face extinction, the height of grain reaches the peak, following the number of deer increase again and making multiple, consecutive circulation like cycling eco-system.

Thus, the zombie population can indirectly control the resting period of the grain growth by decreasing the deer population, meaning that my own quantity is actually affecting the simulation correctly.