Student Name: - ATHARVA DESHPANDE

Student Email: - deshpana@oregonstate.edu

Project No: - Project#2

Project Name: - Functional Decomposition

1. What your own-choice quantity was and how it fits into the simulation.
   ➔ I chose snakes (reptiles) to feed on the rabbits (herbivores). So, I chose to create a Snake function. Snakes being a natural predator of rabbits, the quantity of snakes would directly be impacted according to the number of rabbits. Based on the number of rabbits present, the value of the number of snakes is determined.
   When the number of snakes is greater than or equal to five times the number of rabbits, snake populations decrease by 1, since they do not have enough rabbits to consume. On the contrary, when the number of snakes is less than five times the number of rabbits, snake populations increase by 2, since rabbits population increases, the number of snake populations should increase as well.

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

Month	Number of Snakes	Number of Rabbits	Grass Height	Temperature	Precipitation
1	6	2	10.17	8.54	29.12
2	5	3	14.76	10.63	39.03
3	4	4	29.83	11.88	45.37
4	3	5	47.9	20.34	38.61
5	2	6	59.03	20.65	38.26
6	1	7	65.48	23.44	31.44
7	0	8	54.31	26.77	25.59
8	2	9	34.73	26.58	21.77
9	1	10	12.6	15.75	25.38
10	3	9	30.42	16.67	17.12
11	2	10	36.37	11.28	20.8
12	1	11	31.02	9.96	32.41
13	3	12	21.23	3.32	37.97
14	2	11	0	12.46	41.32
15	1	10	7.46	17.26	43.98
16	3	9	23.48	18.94	45.1
17	2	9	31.08	18.52	33.38
18	1	10	46.18	30.66	33.2
19	3	11	20.81	27.39	24.15
20	2	10	0	27.89	24
21	1	9	0	19.87	21.87
22	0	8	0	14.12	25.58
23	2	7	20.41	9.05	20.94
24	1	8	11.88	7.58	30.37
25	0	7	0	10	37.17
26	2	6	0.83	10.63	38.28

27	1	5	8.46	12.45	42.11
28	0	4	30.56	17.83	44.83
29	0	5	58	22.12	34.88
30	2	6	57.84	31.61	32.91
31	1	7	42.61	23.54	23.53
32	0	8	29.99	21.52	24.27
33	2	9	22.85	17.62	25.45
34	1	8	37.77	10.84	20.68
35	0	9	35.01	6.63	23.43
36	2	10	15.21	-0.62	29.64
37	1	9	0	6.89	34.53
38	0	8	0	8.54	37.34
39	2	7	0	13.83	39.9
40	1	6	27.01	20.58	38.1
41	0	7	33.93	24.61	42.03
42	2	8	19.49	25.64	36.88
43	1	7	1.04	26.63	31.52
44	0	6	0	23.27	20.19
45	2	5	0	16.33	23.66
46	1	4	27.29	18.1	19.74
47	0	5	45.05	9.85	20.2
48	2	6	44.63	7.22	27.05
49	1	7	34.16	3.66	33.18
50	0	8	16.89	12.01	38.19
51	2	7	30.04	9.77	40.72
52	1	8	28.71	15.46	43.17
53	0	9	54.82	26.23	39.89
54	2	10	33.19	29.11	29.11
55	1	11	7.91	29.17	29.3
56	3	10	0	26.03	22.91
57	2	9	0	17.22	20.94
58	1	8	10.49	12.07	23.44
59	0	7	17.48	3.47	28.01
60	2	6	0.11	0.09	28.55
61	1	5	0	1.8	33.45
62	0	4	0	6.38	39.8
63	0	3	0	9.97	42.93
64	0	2	9.37	19.16	42.36
65	0	3	35.34	28.08	41.82
66	0	4	28.01	30.23	29.07
67	0	5	17.9	31.77	24.12
68	2	6	5.21	21.27	23.5
69	1	5	4.05	20.27	20.2

70	0	4	8.51	10.94	22.85
71	0	3	18.18	11.69	19.21
72	0	4	31.23	4.67	25.68

3. A graph showing temperature, precipitation, number of rabbits, height of the rye grass, 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.
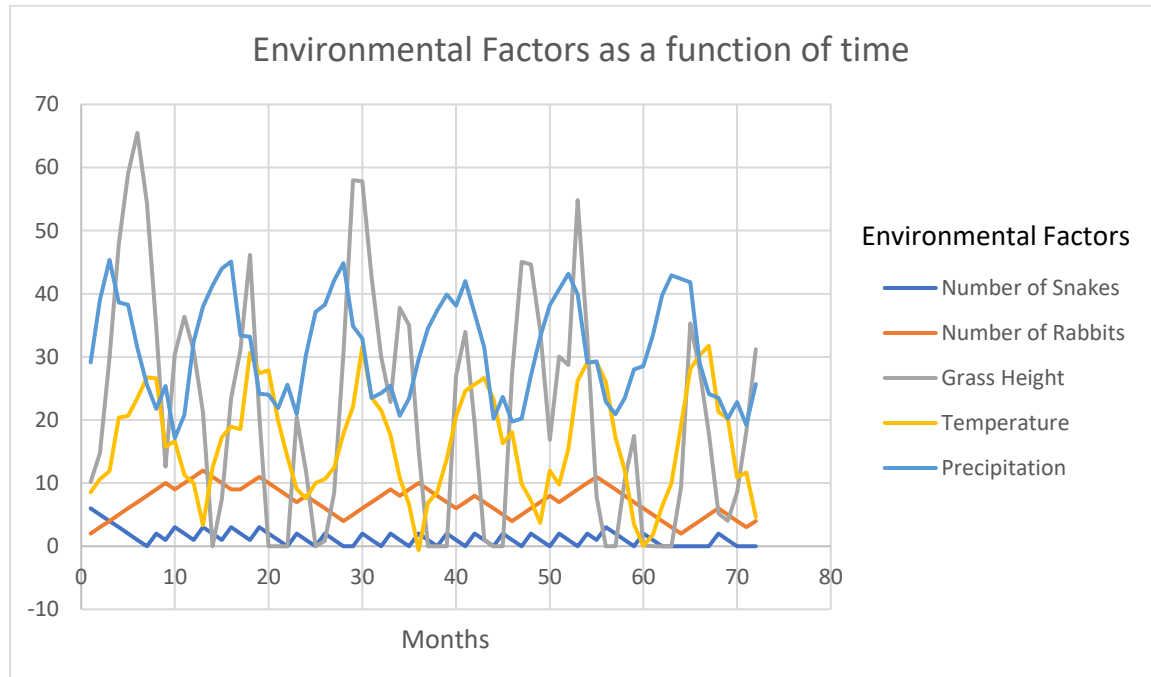
4. A commentary about the patterns in the graph and why they turned out that way. What evidence in the curves proves that your own quantity is actually affecting the simulation correctly?
   ➔ The graph observed above is cyclic in nature. This suggests that every time temperature increases, precipitation would decrease, and rye grass would start reducing. As this happens, the number of rabbits that were increasing due to abundance of grass previously, will now start to decrease due to lack of food. This will cause the number of snakes to decrease as well since they feed off rabbits. Once there are a smaller number of snakes, number of rabbits who consume grass also falls which in turn causes temperatures to drop, precipitation would rise, and grass would start growing back again and thus number of rabbits would increase again, which would further increase the number of snakes.

   Eg: - In the 14th month, height of rye grass drops to zero. This is where we start seeing the decline in the number of rabbits and snakes accordingly. This number increases only after grass grows back significantly in the 18th month.

Effect of Snakes –

As we can see from the graph that grass drops to 0 in the 14th month. Due to this, we can see a small drop in the number of rabbits (to 12). The decrease in number of rabbits impacted the number of snakes during that month and the resulting count went down to 2.

The grass height went on increasing in the 18th month as seen from the graph. So, we can see a small rise in rabbits as well. This rise caused a rise in the number snakes to 3. Although due to decrease in rabbits in this 4-month period, there were small rises and falls of snakes. However, a significant increase in the number of snakes was seen only with a significant increase in the number of rabbits.

There were some instances when the number of snakes dropped to zero during the months 28, 41, 50, etc. One thing to note is that this drop was due to a huge fall in the number of rabbits.

The overall snake graph is very close to 0 at all points. This is mainly due to the limited number of rabbits which was the effect of varying rye grass availability.