Gretel Rajamoney

rajamong@oregonstate.edu

Project #3

Supplementary Question:

1. Tell us what machine you ran this on?
   = I ran my program on my Windows machine utilizing Visual Studio Code. To run my program in the terminal, I inputted the following lines of code:

   ```
   chmod u+x proj03.sh
   proj03.sh >& proj03.csv
   ```

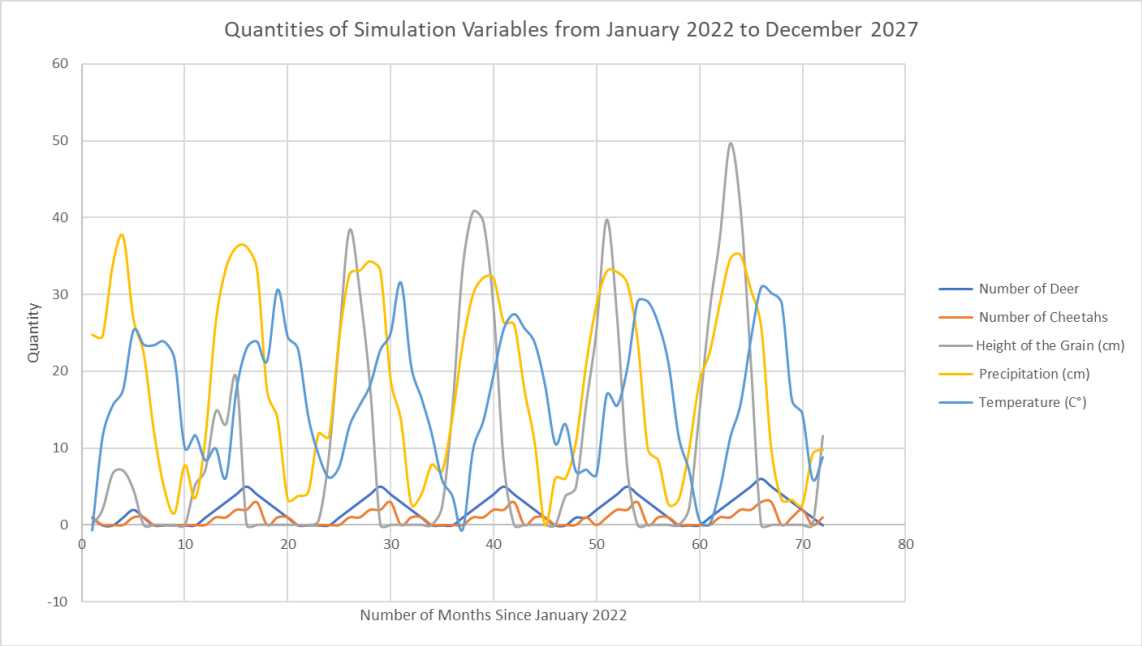
Project Questions:

1. What your own-choice quantity was and how it fits into the simulation.
   = The quantity that I added to the simulation are cheetahs. This selected quantity fits into the simulation because in the wild, cheetahs like to feed on deer. Also in the wild, cheetahs will not join in when they see another cheetah eating a deer because they fear that they will be attacked by this cheetah. Another factor about the simulation is that when a deer is all alone in the wild, several cheetahs will circle around and attempt to go eat that deer because they are hungry. Therefore the more deer there are, the more cheetahs will appear. And vice versa, if there are not enough deer to feed the cheetahs, they will migrate from the area so that they do not die of starvation. The deer in this simulation enjoy grazing on grain, which is how the grain is incorporated into the simulation. But cheetahs do not eat grain because they are strictly meat-eating animals, instead these cheetahs enjoy hiding in this grain because the color of their fur allows them to blend in with the grain. Since cheetahs are quite large wild cats, they require twice as much wheat in comparison to the deer in order to successfully blend in with their surroundings. This factor of cheetahs camouflaging explains the reasoning behind the constant variables present in the simulation. Similarly to the cheetahs migrating when there are not enough deer available, the deer also migrate when there is not enough grain available for them to graze on. As stated within the assignment, the amount that the grain grows is dependent on a couple factors such as the temperature in the area, the amount of precipitation that the area receives, as well as the number of deer that are surrounding the area to graze on this grain. Since temperature and precipitation are very dependent on the season, as the months go by and random weather patterns are endured, the amount of grain, the number of deer in the area, and the number of cheetahs in the area are all affected.

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.

Temperature (C°)	Precipitation (cm)	Number of Deer	Height of the Grain (cm)	Month Number
-0.72727	24.767525	1	0.000001	1
11.41669	24.562624	0	1.983984	2
15.606927	33.867992	0	6.710868	3
17.629713	37.578354	1	7.071886	4
25.324884	26.872944	2	4.596891	5
23.521368	22.323996	1	0	6
23.438232	12.163411	0	0	7
23.898977	4.746546	0	0.000146	8
21.601871	1.534469	0	0.000202	9
9.999665	7.77638	0	0.000883	10
11.688125	3.46033	0	5.197931	11
8.403986	11.34457	1	7.178212	12
9.962219	26.279007	2	14.765277	13
6.191145	33.418247	3	13.119568	14
17.44516	36.156796	4	19.163763	15
23.013857	36.188946	5	0	16
23.917091	33.364594	4	0	17
21.39164	17.443014	3	0	18
30.664822	13.928409	2	0	19
24.514597	3.30211	1	0	20
22.913212	3.764805	0	0	21
14.115164	4.265797	0	0.000176	22
9.143278	11.914288	0	0.552805	23
6.171752	11.476612	0	8.985677	24
7.580609	24.243765	1	24.352879	25
12.875548	32.618874	2	38.400311	26
15.608448	33.119549	3	30.347822	27
18.205494	34.315136	4	18.015278	28
22.810305	33.096291	5	0	29
25.000593	18.939276	4	0	30
31.607742	13.636042	3	0	31
20.659416	2.685691	2	0	32
16.535948	4.031839	1	0	33
11.866883	7.844685	0	0	34
5.863961	7.013764	0	2.379034	35
3.754487	13.965808	0	15.060195	36
-0.617398	23.514965	1	33.441174	37
9.762802	29.979589	2	40.812916	38
13.518066	32.177742	3	39.503201	39
19.578209	32.102436	4	28.281176	40
25.565605	26.360329	5	7.973944	41
27.488466	26.092506	4	0	42
25.643013	17.60441	3	0	43
23.755604	10.67732	2	0	44
18.290083	0	1	0	45
10.582539	6.052022	0	0	46
13.12265	6.072581	0	3.775169	47
6.973881	10.741014	1	4.891785	48
7.215436	20.926704	1	15.668473	49
6.532019	28.627823	2	25.32921	50
16.994722	33.030556	3	39.78096	51
15.517152	32.92297	4	27.207882	52
20.443642	31.433319	5	7.282147	53
29.109375	23.948097	4	0	54
29.113832	9.832342	3	0	55
26.292406	8.45662	2	0	56
21.051563	2.67236	1	0	57
11.466548	3.335371	0	0	58
7.092599	9.773593	0	2.175223	59
0.598106	18.548922	0	14.64976	60
0.089315	22.423517	1	27.811314	61
4.678069	28.897848	2	37.467464	62
11.360181	34.639183	3	49.698402	63
15.721188	35.139687	4	41.250736	64
24.140375	30.620403	5	21.251266	65
30.950809	25.881304	6	0	66
30.226236	9.798634	5	0	67
28.895332	3.272464	4	0	68
16.287487	3.25931	3	0	69
14.517456	2.595538	2	0	70
5.960344	9.182866	1	0	71
8.809361	9.753336	0	11.575751	72

3. A graph showing temperature, precipitation, number of deer, height of the grain, and your own-choice quantity as a function of month number.



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?

   = Within the assignment, it states that the amount that the grain grows is dependent on a couple factors such as the temperature in the area, the amount of precipitation that the area receives, as well as the number of deer that are surrounding the area to graze on this wheat. To simulate seasons within the months of the year, both the temperature and precipitation values follow a cosine and sine wave with additional randomness prevalent in order to mimic the various weather patterns endured in the real world. As shown in the graph above, as the centimeters of precipitation increases, the height of the grain in centimeters also increases. This pattern in the graph makes the simulation appear much more comparable to real-world patterns because in general, the more rainfall that nature receives the more that nature is able to grow since the soil is hydrated allowing for plants such as grain to thrive. The graph also appears to have a directly related association between the number of deer and the number of cheetahs. This is because as the number of deers increases, the number of cheetahs also increases, because there are more opportunities for feeding on them which attracts more and more cheetahs to enter the area where the deer are located. The majority of the variables present within the graph appear to be directly correlated with each other. As the temperature and precipitation both increase, the height of the grain also

increases. This increase in grain attracts more deer because the amount of grain available to graze on also increases, providing them with an incentive to come to the area as well as to stay in the area as opposed to migrating away. This influx in deer causes the height of the grain to rapidly decrease because the grain is unable to grow fast enough to sustain the amount of deer feeding on it. This influx of deer also causes a rapid increase in the number of cheetahs in the area, since the cheetahs see that they have plenty of deer to feed on which attracts them to the area. As the total number of cheetahs increase, the number of deer and grain decrease significantly causing a major dip in the quantities present in the graph as shown above. This is because the cheetahs are feeding on the deer, and are utilizing the grain to camouflage as they attempt to prey on them. At each point when the graph arrives at its breaking point, all variables rapidly dip, with temperature and precipitation remaining constant and unaffected. This is because increases in deer or cheetah populations have no effect on weather patterns. After the inconsistent quantities dip, the area is able to recover since the temperature and precipitation nourish the land allowing for the grain to regrow. Once the grain has begun growing, the deer and cheetahs arrive, restarting the same cycle mentioned earlier. This pattern constantly repeats from January of 2022 where our data begins, to December of 2027 when our data ends.