

CS 575

Project #3

Functional Decomposition

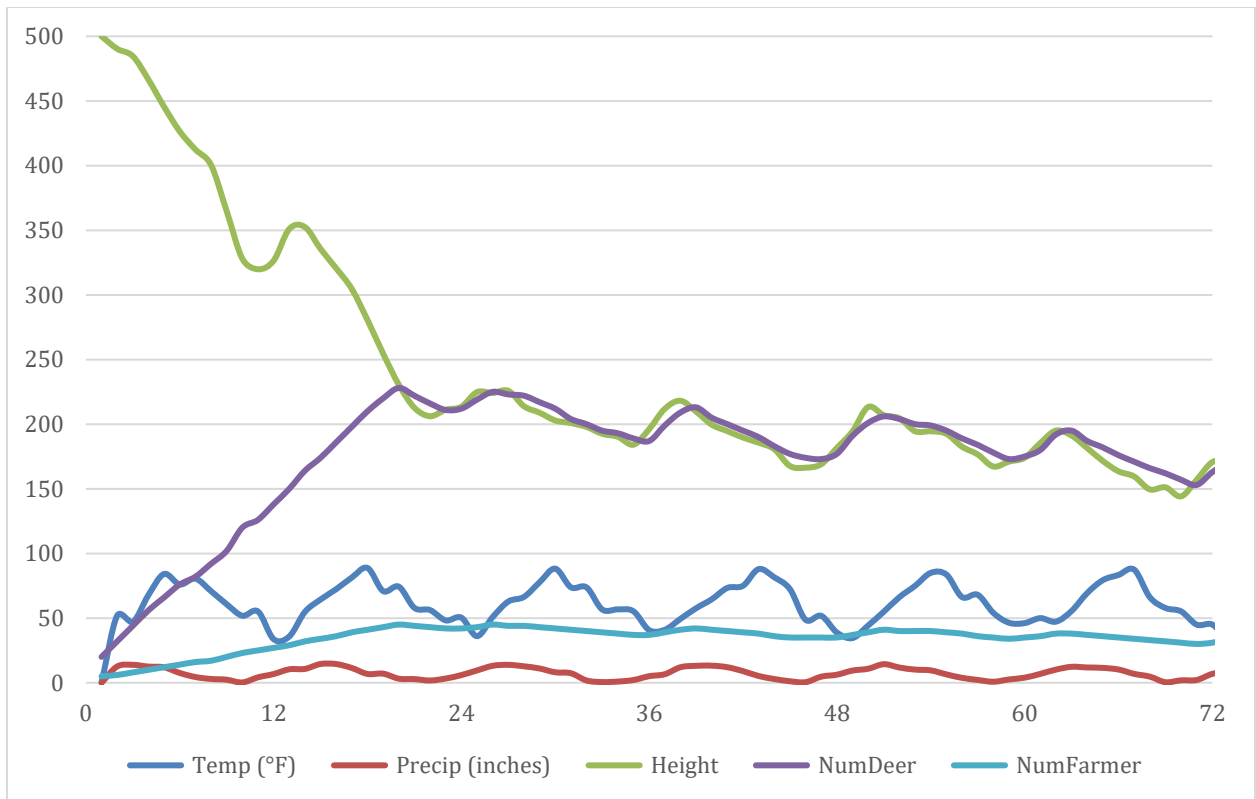
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In this project, I used farmer as my own-choice quantity. The number of farmers affects both the amount the grain grows and the number of deer. Each farmer increases the growth of grain by 5.0 inches per month and eats 0.5 deer per month. Meanwhile, the number of farmers is affected by the number of deer since (# of deer / 5) farmers are needed to take care of deer.

Then, the output table and graph of the simulation are:

Index	Temp (°F)	Precip (inches)	Height	NumDeer	NumFarmer	Index	Temp (°F)	Precip (inches)	Height	NumDeer	NumFarmer
0	0	0	500	20	5	37	49.382591	11.985676	218.1123	209	41
1	51.848259	12.581077	490.3421	32	6	38	57.625355	13.097335	209.7977	213	42
2	46.962036	13.849324	484.6655	44	8	39	64.540619	13.208433	199.6281	205	41
3	67.867889	12.506975	466.4625	56	10	40	73.358139	12.017831	194.6483	200	40
4	84.137497	11.931173	445.4661	66	12	41	74.995728	8.985059	189.6487	195	39
5	76.004814	7.556903	426.4662	76	14	42	87.917145	5.214867	185.6488	190	38
6	80.498825	4.421145	412.4662	82	16	43	81.561058	2.88095	180.6488	183	36
7	70.850433	2.932564	400.4674	92	17	44	72.407928	1.1536	167.6494	177	35
8	60.733173	2.345844	364.8084	102	20	45	48.70599	0.449435	166.3436	174	35
9	51.822006	0.2396	328.0251	120	23	46	51.749073	4.709939	169.0544	173	35
10	55.143478	4.19351	319.8285	126	25	47	38.848587	6.221388	181.5643	177	35
11	33.70636	6.736226	326.4588	138	27	48	34.589775	9.414175	194.4232	191	37
12	35.777882	10.403017	350.9764	150	29	49	44.287594	10.822595	213.3072	201	39
13	54.82362	10.69988	352.4694	164	32	50	54.964401	14.348931	206.9196	206	41
14	64.394363	14.511088	335.5356	174	34	51	66.219383	11.746453	204.5338	204	40
15	72.373405	14.445267	320.5556	186	36	52	74.973358	10.173924	194.543	200	40
16	81.402435	11.424366	304.5558	198	39	53	84.981934	9.568584	194.543	199	40
17	88.783653	6.790201	280.5558	210	41	54	83.695869	6.464362	192.543	195	39
18	70.890587	7.022717	254.557	220	43	55	66.261711	3.794198	182.5678	189	38
19	74.324837	3.154187	230.5584	228	45	56	68.036469	2.147733	176.5878	184	36
20	57.889793	2.817926	212.6531	222	44	57	54.061947	0.767678	167.2478	178	35
21	56.212429	1.72118	206.1816	216	43	58	46.401337	2.53912	171.0511	173	34
22	48.23288	3.277365	211.1412	211	42	59	46.134041	3.926109	173.9864	175	35
23	50.348007	5.932621	213.5063	212	42	60	49.959675	6.848771	185.3247	180	36
24	36.037804	9.545637	224.8267	219	43	61	47.234074	10.155172	195.0052	192	38
25	50.817238	13.106265	224.0963	225	45	62	55.495949	12.320497	191.2004	195	38
26	62.820801	13.849873	225.8046	223	44	63	69.385979	11.819905	181.5246	187	37
27	66.394569	12.714256	213.8707	222	44	64	79.336975	11.504748	171.5276	182	36
28	77.713844	11.025923	208.8785	217	43	65	83.381699	10.231501	163.5276	176	35
29	88.255493	8.089425	202.8785	212	42	66	87.501389	6.864826	159.5276	171	34
30	73.835983	7.362168	200.8792	204	41	67	66.195358	4.731252	149.5634	166	33
31	73.749313	1.766322	197.8795	200	40	68	57.831436	0.432665	151.1701	162	32
32	56.676373	0.522111	192.5611	195	39	69	55.217361	1.866005	144.1535	157	31
33	56.738087	0.911799	190.2667	193	38	70	44.944969	2.131509	156.9955	153	30
34	55.277939	2.096811	184.146	189	37	71	44.971195	6.88216	170.6811	163	31
35	40.701309	5.062406	196.1345	187	37	72	32.645531	8.496594	170.9295	170	34
36	40.937798	6.594355	211.8738	199	39						



From the graph, we can observe at the beginning that the amount of grain decreases while the number of deer and farmer increase. It is because the amount of grain is sufficient for deer reproduction. Since the number of deer increases, more farmers are needed to take care of them. At this time, the growth (the growth affected by Temp and Precip plus the growth affected by farmers) cannot satisfy the deer's need, so the Height decreases. At about the 20th month, the amount of grain, deer, and farmer reaches a balance point. Now, the consumption of grain matches its production. This shows that my own quantity is affecting the simulation correctly, otherwise, it would not reach this balance point. After this point, the impacts of Temp and Precip on Height, NumDeer, and NumFarmer turn to be obvious. Temp and Precip determine how good the grain grows and hence impact the number of both deer and farmers. Since Temp and Precip follow cosine and sine wave patterns, the curves of Height, NumDeer, and NumFarmer follow the patterns as well.