ENGR 13300 Fall 2021

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Assignment	Ind HW13 MA5 Task 4	**Purdue login of Contributor**		**Purdue login of Contributor**	

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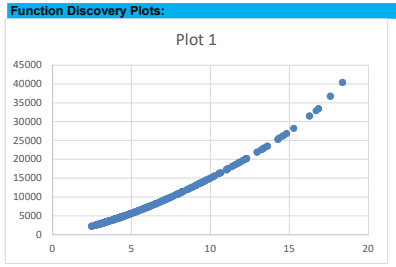
Problem Description This problem charts the riverhight and its correlation to streamflow, then it analyzes the plotting results from it.

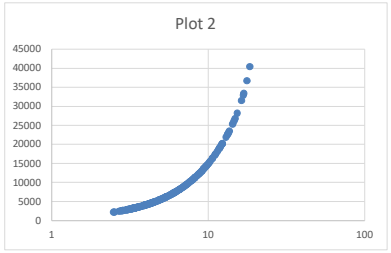
Input Section:

River Height (ft)	Streamflow (ft^3/s)
2.51	2250
3.27	3170
3.65	3670
4.29	4560
4.19	4410
3.99	4130
3.69	3720
3.68	3710
3.39	3320
3.15	3020
3.03	2870
2.95	2770
2.76	2540
2.84	2640
2.84	2640
2.68	2450
3.04	2880
3.31	3220
3.54	3520
3.42	3360
3.42	3360
3.9	4010
7.64	10200
6.89	8800
5.86	7010
4.77	5270
4.41	4730
4.59	5000
4.17	4390
4.07	4250
3.53	3500
3.26	3150
3.93	4050
3.55	3530
3.86	3950
3.69	3720
4.09	4270
4.01	4160
3.74	3790
3.64	3650
3.46	3410
3.39	3320
3.45	3400
3.42	3360
3.56	3550
3.53	3510
3.33	3240
3.32	3230
3.24	3130
3.29	3190
3.34	3260
3.22	3100
3.27	3170
3.24	3130
3.55	3530
4.04	4200
4.86	5410
5.18	5900
4.52	4890
4.36	4660
5.58	6550
8.2	11300
7.39	9720
6.07	7360
4.96	5560
4.23	4470

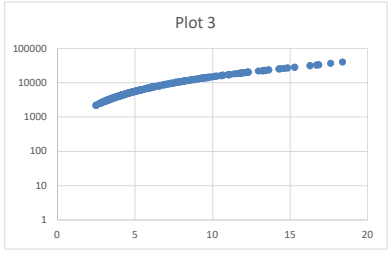
Function Discovery Plots:



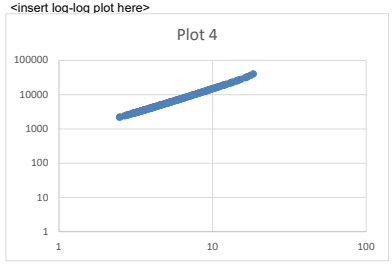
<insert log-linear plot here>



<insert linear-log plot here>



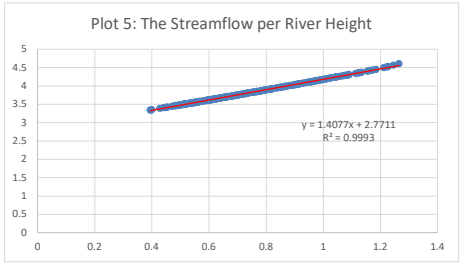
<insert log-log plot here>



Linearization:

0.399673721	3.3521825
0.514547753	3.5010593
0.562292864	3.5646661
0.632457292	3.6589648
0.622214023	3.6444386
0.600972896	3.6159501
0.567026366	3.5705429
0.565847819	3.5693739
0.530199698	3.5211381
0.498310554	3.4800069
0.481442629	3.4578819
0.469822016	3.4424798
0.440909082	3.4048337
0.45331834	3.4216039
0.45331834	3.4216039
0.428134794	3.3891661
0.482873584	3.4593925
0.519827994	3.5078559
0.549003262	3.5465427
0.534026106	3.5263393
0.534026106	3.5263393
0.591064607	3.6031444
0.883093359	4.0086002
0.838219222	3.9444827
0.767897616	3.845718
0.678518379	3.7218106
0.644438589	3.6748611
0.661812686	3.69897
0.620136055	3.6424645
0.609594409	3.6283889
0.547774705	3.544068
0.5132176	3.4983106
0.59439255	3.607455
0.550228353	3.5477747
0.586587305	3.5965971
0.567026366	3.5705429
0.611723308	3.6304279
0.603144373	3.6190933
0.572871602	3.5786392
0.561101384	3.5622929
0.539076099	3.5327544
0.530199698	3.5211381
0.537819095	3.5314789
0.534026106	3.5263393
0.551449998	3.5502284
0.547774705	3.5453071
0.522444234	3.510545
0.521138084	3.5092025
0.51054501	3.4955443
0.517195898	3.5037907
0.523746467	3.5132176
0.507855872	3.4913617
0.514547753	3.5010593
0.51054501	3.4955443
0.550228353	3.5477747
0.606381365	3.6232493
0.686636269	3.7331973
0.71432976	3.770852
0.655138435	3.6893089
0.639486489	3.6683859
0.746634199	3.8162413
0.913813852	4.0530784
0.868644438	3.9876663
0.783188691	3.8668778
0.695481676	3.7450748
0.626340367	3.6503075
0.609594409	3.6273659

Linearized Plot:



4.07	4240	0.614897216	3.6344773
4.12	4310	0.625312451	3.6493349
4.22	4460	0.614897216	3.6344773
4.12	4310	0.604226053	3.6201361
4.02	4170	0.57863921	3.5854607
3.79	3850	0.587710965	3.5976952
3.87	3960	0.559906625	3.5611014
3.63	3640	0.551449998	3.5502284
3.56	3550	0.494154594	3.4742163
3.12	2980	0.394451681	3.3443923
2.48	2210	0.445604203	3.4099331
2.79	2570	0.494154594	3.4727564
3.12	2970	0.503790683	3.4857214
3.19	3060	0.511883361	3.4983106
3.25	3150	0.51851394	3.506505
3.3	3210	0.477121255	3.4517864
3	2830	0.485721426	3.463893
3.06	2910	0.484299839	3.4608978
3.05	2890	0.487138375	3.4653829
3.07	2920	0.498310554	3.4800069
3.15	3020	0.702430536	3.7543483
5.04	5680	1.087071206	4.3031961
12.22	20100	1.089551883	4.3053514
12.29	20200	1.041392685	4.2355284
11	17200	0.959041392	4.1172713
9.1	13100	0.898176483	4.0293838
7.91	10700	0.77815125	3.860338
6	7250	0.7355989	3.8007171
5.44	6320	0.721810615	3.7817554
5.27	6050	1.079904468	4.2922561
12.02	19600	1.043362278	4.2380461
11.05	17300	0.974511693	4.1398791
9.43	13800	0.875061263	3.9969492
7.5	9930	0.773054693	3.85248
5.93	7120	0.767897616	3.845718
5.86	7010	0.781755375	3.8645111
6.05	7320	0.797959644	3.8876173
6.28	7720	0.984077034	4.1522883
9.64	14200	1.133858125	4.3710679
13.61	23500	1.089198367	4.3053514
12.28	20200	1.063708559	4.2695129
11.58	18600	1.022840611	4.209515
10.54	16200	1.120902818	4.3521825
13.21	22500	1.184123354	4.4502491
15.28	28200	1.15715444	4.40824
14.36	25600	1.245512668	4.5646661
17.6	36700	1.264109156	4.6063814
18.37	40400	1.222716471	4.5171959
16.7	32900	1.170848204	4.4281348
14.82	26800	1.127428778	4.3617278
13.41	23000	1.112605002	4.3404441
12.96	21900	1.072249898	4.2810334
11.81	19100	1.046104787	4.243038
11.12	17500	1.000434077	4.1760913
10.01	15000	0.969415912	4.1335389
9.32	13600	0.937517892	4.0863598
8.66	12200	0.913813852	4.0530784
8.2	11300	0.860338007	3.9758911
7.25	9460	0.840733235	3.9479236
6.93	8870	0.820201459	3.9190781
6.61	8300	0.802773725	3.8943161
6.35	7840	0.796574333	3.8859263
6.26	7690	0.767155866	3.8444772
5.85	6990	0.81756537	3.9153998
6.57	8230	1.056523724	4.2576786
11.39	18100	1.026941628	4.2148438
10.64	16400	0.957128198	4.1139434
9.06	13000	0.902002891	4.0334238
7.98	10800	0.911157609	4.049218
8.15	11200	1.026533265	4.2148438
10.63	16400	0.978636948	4.146128
9.52	14000	0.897077003	4.0293838
7.89	10700	0.832508913	3.9365137
6.8	8640	0.783188691	3.8668778
6.07	7360	0.753583059	3.8254261
5.67	6690	0.733999287	3.7986506
5.42	6290	0.699837726	3.7512791
5.01	5640	0.693726949	3.7427251
4.94	5530	0.675778342	3.7176705
4.74	5220	0.665580991	3.7041505
4.63	5060	0.655138435	3.6893089

4.52	4890	0.663700925	3.701568
4.61	5030	0.640481437	3.6693169
4.37	4670	0.638489257	3.666518
4.35	4640	0.656098202	3.6910815
4.53	4910	0.698100546	3.7489629
4.99	5610	0.892094603	4.0211893
7.8	10500	0.865103975	3.9827234
7.33	9610	0.819543936	3.9180303
6.6	8280	0.760422483	3.8350561
5.76	6840	0.72427587	3.7846173
5.3	6090	0.726727209	3.7881684
5.33	6140	0.715167358	3.7723217
5.19	5920	0.788875116	3.8750613
6.15	7500	0.813580989	3.909556
6.51	8120	0.730782276	3.7937904
5.38	6220	0.685741739	3.7315888
4.85	5390	0.652246341	3.6857417
4.49	4850	0.631443769	3.6570559
4.28	4540	0.626340367	3.6503075
4.23	4470	0.589949601	3.6009729
3.89	3990	0.596597096	3.6106602
3.95	4080	0.580924976	3.5888317
3.81	3880	0.589949601	3.6009729
3.89	3990	0.625312451	3.6493349
4.22	4460	0.85672889	3.9708116
7.19	9350	0.994756945	4.1673173
9.88	14700	0.985875357	4.155336
9.68	14300	0.906873535	4.0413927
8.07	11000	0.790988475	3.877947
6.18	7550	0.848804701	3.9595184
7.06	9110	0.970811611	4.1335389
9.35	13600	0.967547976	4.1303338
9.28	13500	0.915927212	4.0569049
8.24	11400	0.945960704	4.09691
8.83	12500	1.154728207	4.4031205
14.28	25300	1.124178055	4.3560259
13.31	22700	1.074084689	4.2833012
11.86	19200	1.011570444	4.1931246
10.27	15600	0.945468585	4.09691
8.82	12500	0.989004616	4.161368
9.75	14500	1.211654401	4.4983106
16.28	31500	1.226342087	4.5237465
16.84	33400	1.164352856	4.4183013
14.6	26200	1.070776463	4.2787536
11.77	19000	1.008174184	4.1875207
10.19	15400	0.95568775	4.1105897
9.03	12900	0.935507266	4.0827854
8.62	12100	0.927370363	4.071882
8.46	11800	0.881954971	4.0086002
7.62	10200	0.849419414	3.9604708
7.07	9130	0.8162413	3.9132839
6.55	8190	0.781036939	3.8639174
6.04	7310	0.738780558	3.8048207
5.48	6380	0.729974286	3.7930916
5.37	6210	0.756636108	3.8299467
5.71	6760	0.72916479	3.7916906
5.36	6190	0.704150517	3.7566361
5.06	5710	0.681241237	3.7250945
4.8	5310	0.656098202	3.6910815
4.53	4910	0.63447727	3.6618127
4.31	4590	0.62838893	3.6532125
4.25	4500	0.625312451	3.6493349
4.22	4460		

Q1: Which type of function do you think best represents the data, after plotting the data using the four different scaling options? Provide a reason for your selection.

I belive function is best suited by a power function, since it look the most linear when the both the x-axis and y-axis were both on log scale. Hence the function would be best suited by using a linear fuction while using the logarithmic scaling on both axises. There for to linearize the data, I will plot the log of both y and x values.

Q2: Determine the model (i.e., the general form) of the function you diagnosed in Q1. Show work as necessary. Manage the decimal precision of the coefficients.

Work

log 10 flow = log10(flow)

log 10 height = log10(h)

flow(ft^3/s)	height(ft)	log 10 flow	log 10 height
2250	2.51	3.3521825	0.399673721
3170	3.27	3.5010593	0.514547753
3670	3.65	3.5646661	0.562292864
4560	4.29	3.6589648	0.632457292
4410	4.19	3.6444386	0.622214023

Model

log10flow = 1.4077(log 10 h)+2.7711

flow = 10^(1.4077(log(h)+2.7711)

Q3: Use your model to predict the streamflow for the river heights listed below.

Height (ft)	Streamflow (ft^3/s)
2	*1566.24582*
6	*7353.65947*
12	*19510.2772*
18	*34526.0667*
26	*57937.2639*