

Lecture I: Random Draw

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- As a starting point in constructing a pseudo random number generator - start with a seed (hopefully odd and prime) $x_1 = 13,579$.
- Next, the best random number generators are based on the largest integer available for a compiler. In this case we use a large integer $k = 9^{11}$.
- To generate a random number, we divide this large number by the seed and take the modulus

$$\text{mod}(9^{11}, 13,579) = 11,619 \quad (1)$$

- Let's set the random variable equal to

$$u_1 = \frac{\text{mod}(9^{11}, 13,579)}{13,579} = 0.8557. \quad (2)$$

- We move the index forward by making the next seed equal to

$$x_2 = \text{int}(u_1 \times 9^{11}) = 331,500,011 \quad (3)$$

Table 1: Pseudo Random Numbers

	Value	Mod()	$Mod()/9^{11}$	$p * 9^{11}$		Rand()	
Seed	13579	11619	0.85566	331500011		0.76642	
2	331500011	55920478	0.16869	65353659	-0.11798	0.66864	0.02645
3	65353659	60652194	0.92806	359549916	-0.14296	0.21363	-0.04040
4	359549916	27870573	0.07752	30030965	-0.18074	0.42944	0.03951
5	30030965	27048909	0.90070	348949877	-0.16880	0.80831	-0.03082
6	348949877	38470612	0.11025	42711874	-0.15614	0.06924	-0.12469
7	42711874	3013623	0.07056	27335239	0.17885	0.43178	0.05546
8	27335239	4727143	0.17293	66997477	0.15107	0.53261	0.00175
9	66997477	52433104	0.78261	303200354	-0.09163	0.30445	0.00367
10	303200354	84220135	0.27777	107614009	-0.06345	0.79596	-0.06039
11	107614009	64578462	0.60009	232488498	-0.02037	0.60321	0.01378
12	232488498	154931991	0.66641	258179773	0.01318	0.08411	-0.02573
13	258179773	129240716	0.50058	193936576	-0.00201	0.60301	-0.02564
14	193936576	193483913	0.99767	386516219	-0.00638	0.54532	-0.00013
15	386516219	904270	0.00234	906385	-0.24748	0.53424	0.00003
16	906385	394094	0.43480	168449489	0.04039	0.85723	-0.00417
17	168449489	50521511	0.29992	116195475	0.01689	0.79997	0.07809
18	116195475	38834064	0.33421	129481049	0.03840	0.18178	-0.09231
19	129481049	128458391	0.99210	384360592	-0.08589	0.59115	-0.01590
20	384360592	3059897	0.00796	3084256	-0.24194	0.26767	-0.01217
21	3084256	1888489	0.61230	237217446	-0.04984	0.11740	0.12049
22	237217446	150203043	0.63319	245309682	0.01177	0.77887	-0.09947
23	245309682	142110807	0.57931	224437282	0.00783	0.75109	0.04702
24	224437282	162983207	0.72619	281339326	0.01392	0.43709	-0.02250
25	281339326	106081163	0.37706	146079883	-0.02904	0.73708	-0.02095
26	146079883	95260723	0.65211	252642288	-0.01891	0.00250	-0.10325
27	252642288	134778201	0.53347	206678925	0.00273	0.79600	-0.13538
28	206678925	180741564	0.87450	338800799	0.00711	0.72103	0.04304
29	338800799	48619690	0.14351	55596870	-0.13357	0.77174	0.03883
30	55596870	53839269	0.96839	375172845	-0.16833	0.57152	0.00534
31	375172845	12247644	0.03265	12647472	-0.21873	0.75583	0.00496
32	12647472	7996329	0.63225	244945526	-0.05700	0.47521	-0.01509
33	244945526	142474963	0.58166	225346919	0.00804	0.87492	-0.02372
34	225346919	162073570	0.71922	278639805	0.01395	0.91076	0.11880
35	278639805	108780684	0.39040	151248547	-0.02535	0.65819	0.04012
36	151248547	84923395	0.56148	217529780	-0.00589	0.84061	0.03237
37	217529780	169890709	0.78100	302575314	0.01275	0.07758	-0.13770
38	302575314	84845175	0.28041	108636619	-0.06236	0.89531	-0.16342
39	108636619	61510632	0.56621	219359543	-0.01224	0.81513	0.09296
40	219359543	168060946	0.76614	296819791	0.01323	0.35781	-0.05078
41	296819791	90600698	0.30524	118255479	-0.05263	0.54359	0.00078
42	118255479	32654052	0.27613	106978965	0.04956	0.17855	0.00152
43	106978965	66483594	0.62146	240767953	-0.02559	0.79537	-0.09143
44	240767953	146652536	0.60910	235979068	0.01027	0.90738	0.08908
45	235979068	151441421	0.64176	248630142	0.01220	0.09946	-0.16122
46	248630142	138790347	0.55822	216265910	0.00569	0.76595	-0.09783
47	216265910	171154579	0.79141	306607688	0.01234	0.68560	0.03010
48	306607688	80812801	0.26357	102112687	-0.06946	0.46707	-0.01112
49	102112687	81082428	0.79405	307630665	-0.07013	0.01755	0.04275
50	307630665	79789824	0.25937	100484822	-0.07130	0.80504	-0.13643
51	100484822	85966023	0.85551	331443077	-0.08694	0.74914	0.05184
52	331443077	55977412	0.16889	65431435	-0.11786	0.34756	-0.04032
53	65431435	60263314	0.92101	356819968	-0.14045	0.56816	-0.00410
54	356819968	30600521	0.08576	33224790	-0.17431	0.21139	-0.00688
			0.51377			0.54770	-0.01463
			0.08568	2	-0.04709	0.07471	

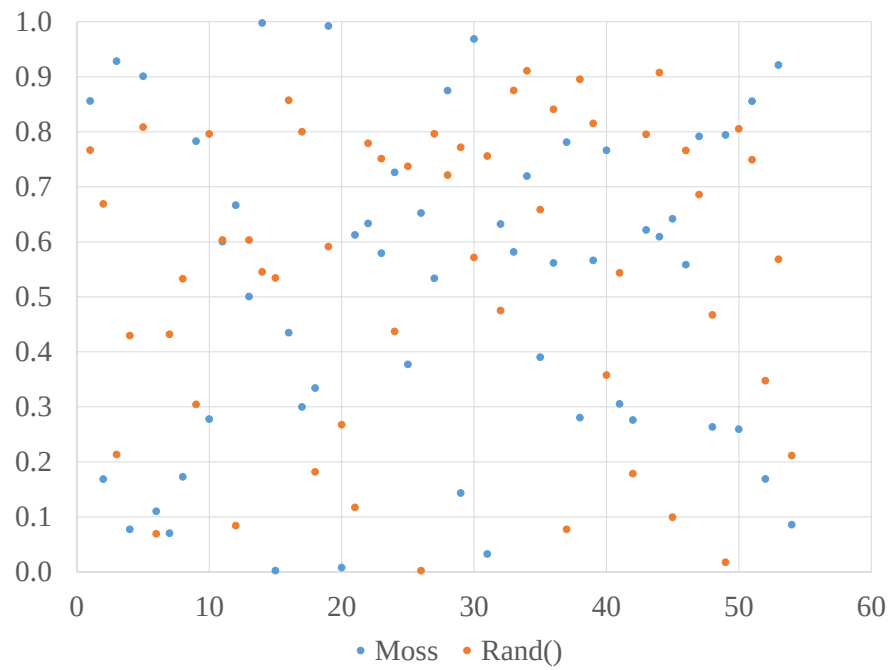


Figure 1: Random Draws