Sampling People, Records, & Networks
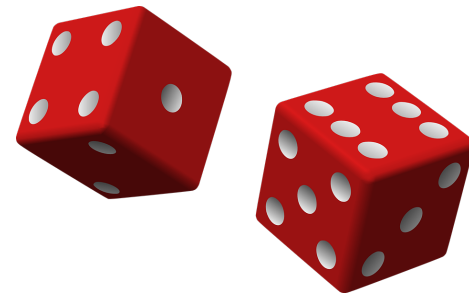
Jim Lepkowski, PhD

Professor & Research Professor *Emeritus*

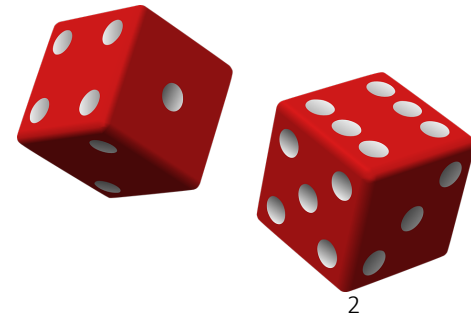**Institute for Social Research, University of Michigan**

Research Professor,

Joint Program in Survey Methodology, University of Maryland

Unit 1

- 1 Research designs …
- 2 Surveys
- 3 Why sample?
- 4 Why randomize?
- 5 Types of sampling
- 6 Evaluating samples
- 7 Units sampled

- **Unit 1: Sampling as a research tool**
  - Lecture 1 – Research design & sampling
  - Lecture 2 – Surveys & sampling
  - Lecture 3 -- Why sample at all?
  - Lecture 4 – Why might we randomize, and how do we do it?
  - Lecture 5 – What happens when we randomize?
  - Lecture 6 – How do we evaluate how good the sample is?
  - Lecture 7 – What kinds of things can we sample?

- **Unit 2: Mere randomization**

- **Unit 3: Saving money**

- **Unit 4: Being more efficient**

- **Unit 5: Simplifying sampling**

- **Unit 6: Some extensions & applications**

Unit 1

- **Unit 1: Sampling as a research tool**
  - Lecture 1 – Research design & sampling
  - Lecture 2 – Surveys & sampling
  - Lecture 3 -- Why sample at all?
  - **Lecture 4 – Why might we randomize, and how do we do it?**
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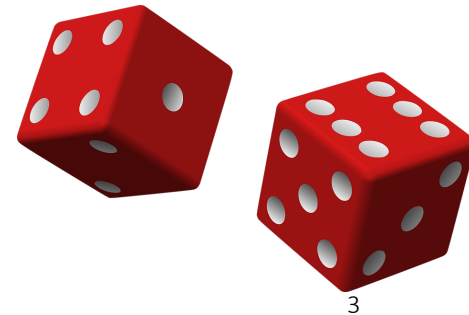 - Lecture 7 – What kinds of things can we sample?

- **Unit 2: Mere randomization**

- **Unit 3: Saving money**

- **Unit 4: Being more efficient**

- **Unit 5: Simplifying sampling**

- **Unit 6: Some extensions & applications**

- Random numbers
- Use in sample selection
- Should we put it back?
- An example of sampling people from a list

- ## Unit 1: Sampling as a research tool
  - Lecture 1 – Research design & sampling
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  - Lecture 3 -- Why sample at all?
  - **Lecture 4 – Why might we randomize, and how do we do it?**
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  - Lecture 6 – How do we evaluate how good the sample is?
  - Lecture 7 – What kinds of things can we sample?

- ## Unit 2: Mere randomization
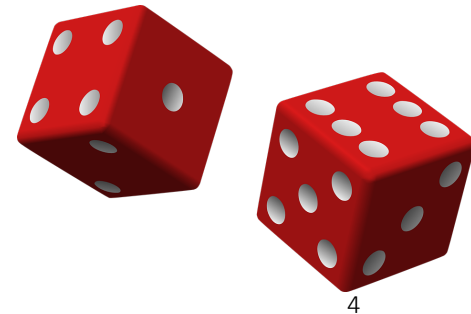- ## Unit 3: Saving money
- ## Unit 4: Being more efficient
- ## Unit 5: Simplifying sampling
- ## Unit 6: Some extensions & applications

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- **Random numbers**
- Use in sample selection
- Should we put it back?
- An example of sampling people from a list

- 10 random numbers:

  0.49018

  0.97294

  0.97638

  0.34525

  0.79619

  0.54778

  0.12256

  0.33297

  0.75083

  0.66288

- **Random numbers**

- Use in sample selection

- Should we put it back?

- An example of sampling people from a list

- **10 random numbers:**

  0.49018

  0.97294

  0.97638

  0.34525

  0.79619

  0.54778

  0.12256

  0.33297

  0.75083

  0.66288

  - **From the Uniform distribution**

- **Random numbers**

- Use in sample selection

- Should we put it back?

- An example of sampling people from a list

- A string of 50 random numbers:

  34042253511835630477439937035317900147964499163908

- **Random numbers**
- Use in sample selection
- Should we put it back?
- An example of sampling people from a list

- **A string of 50 random numbers:**
   34042253511835630477439937035317900147964499163908

   - **Also from the Uniform distribution**

- **Random numbers**
- Use in sample selection
- Should we put it back?
- An example of sampling people from a list

- **A string of 50 random numbers:**
  34042253511835630477439937035317900147964499163908

  - **Also from the Uniform distribution**

- **The string of 50 random numbers in 10 blocks of five each:**
  34042
  25351
  18356
  30477
  43993
  70353
  17900
  14796
  44991
  63908

- **Random numbers**
- Use in sample selection
- Should we put it back?
- An example of sampling people from a list

- **10 random numbers:**
  0.49018

  0.97294

  0.97638

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- **Random numbers**
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  0.49018
  0.97294
  0.97638
  0.34525
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  0.66288

- **From a Normal distribution**

- **Random numbers**

- Use in sample selection

- Should we put it back?

- An example of sampling people from a list

Table of Random Digits

Row	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80	81-85	86-90
1	49018	34042	72000	49522	85941	84723	51072	56454	67420	05025	25234	10671	05579	90906	54706	79486	57057	40468
2	97294	25351	12331	82557	13834	91334	32510	47165	08535	27491	87064	23579	72223	45164	98781	20189	17391	75145
3	97638	18356	31198	39366	37340	76043	77528	21714	44751	81797	28670	50973	07915	45259	45334	88904	47365	37249
4	34525	30477	75462	34635	51422	60669	62413	52524	79883	26235	46933	23381	72335	74702	77289	83419	28761	68996
5	79619	43993	89902	64817	88397	35390	44558	91500	87656	83603	00491	37693	75524	04058	77373	61598	60059	32241
6	54778	70353	54134	19513	89074	07807	74520	59684	47494	58194	29810	91489	45410	28737	55504	50467	94953	25565
7	12256	17900	33754	11853	65033	24106	41833	68345	62300	33076	70119	60498	70180	06929	34567	37075	57735	44602
8	33297	14796	91080	67108	85984	81892	37533	24643	37522	71461	96220	16177	00449	38396	09675	64290	96410	49117
9	75083	44991	46851	46383	00695	54453	34156	49854	68163	83123	89928	39667	15632	43854	04707	41766	01876	20016
10	66288	63908	74090	52902	69701	72959	64480	78123	81841	92675	08731	20577	94939	43211	63438	93640	75825	57922
11	84578	05698	92016	94285	26563	36372	55989	94790	36338	30640	81337	56599	05695	42896	57115	73143	49959	84903
12	55699	23402	30639	39508	41495	44462	11924	70471	97867	82637	18031	38020	70819	64948	17274	67345	31672	66155
13	51917	88538	58239	58633	80392	89447	81230	97654	52579	34888	06454	94398	16452	76723	00902	81924	73166	85669
14	36779	68538	88591	96616	84918	29413	99116	66987	41334	43877	00185	90070	43292	01754	01505	25362	39548	60933
15	49852	36333	84789	65346	46181	61218	54131	57370	64814	44430	43774	72286	11644	33071	74301	02154	37021	04828
16	66752	08578	57498	17884	83667	59532	73254	83347	85751	18536	55969	73265	06726	80734	29351	36800	77081	10687
17	61689	45570	53663	66779	85627	27662	34436	58824	18902	49414	05020	98033	85987	53127	72623	00983	92504	54686
18	19111	76703	32467	51391	85381	48433	68754	89843	02166	59177	80856	71628	27731	90073	04233	34913	46188	28778
19	46913	70576	16918	46675	02304	83330	55894	39684	20753	48885	72907	37048	80065	58931	78214	36397	97252	69593
20	22224	48264	96826	15434	52010	22811	07914	89541	61620	83346	96204	52742	27485	37716	71756	79244	04517	20831
21	84119	49920	29328	03239	15832	72406	94946	45797	70566	19586	26419	40852	70097	02276	93410	87952	71018	96533
22	75594	56191	18861	44995	44764	76960	12585	01842	19324	46085	33903	77234	07418	42805	21925	86305	12510	87281
23	34821	90491	28843	85959	72301	14576	94229	43353	55740	86145	73278	89446	36093	39173	07384	32388	17494	52734
24	23378	01578	09081	20536	31412	00632	16380	14876	26249	00449	26441	14765	05223	08297	54280	35937	02965	79389
25	09985	71346	32130	58906	97244	07003	91231	23396	47378	19064	01118	04376	83218	01890	94316	40309	41332	30966
26	43814	09227	11841	44516	62348	31284	58895	88559	19567	82425	00614	68626	10523	96822	79297	16858	52693	63887
27	26724	80216	75905	54725	46995	75504	79112	50571	57115	02600	35097	04329	78514	02663	48700	57166	30316	97649
28	37876	85859	19333	87221	44809	50700	57889	43075	99310	32235	62624	88356	51865	21946	52479	69599	29065	26434
29	23634	07454	63628	30531	52979	28534	03208	75663	33587	27738	04018	32256	32259	14042	27624	94889	91414	72658
30	10906	61337	16571	98829	96434	25748	01518	97758	93725	64532	79331	25961	82782	23354	47052	36078	12780	78331
31	09372	97239	72017	99537	99977	96404	04824	64248	68816	02734	38384	87274	18213	67600	18730	17870	00226	34180
32	86659	47171	96123	33853	64659	76657	53911	09900	70918	07733	89084	42345	22250	13583	52020	96144	25382	10875
33	78209	23140	94532	89438	43271	89616	63137	85026	15799	62580	70837	50071	74496	94191	45858	13545	66999	77390
34	15430	43742	77673	21745	34854	31505	05275	16758	58996	70211	97794	60918	98986	14446	72130	43056	13412	86691
35	64947	43432	14105	78393	03682	47498	75738	76250	69143	19799	31068	31261	31912	47359	26853	62917	40581	40772
36	71143	09505	65318	29034	89055	17744	48752	69171	08426	08827	14816	61969	68694	19168	67081	26010	68211	80384
37	03104	54280	49703	72368	99964	68555	57769	27567	55962	31100	26364	61603	48176	04177	00935	05130	83625	66323
38	56085	69548	50876	92855	52293	11580	22797	94044	67994	50651	26397	01782	73341	80486	72738	66943	75883	10106
39	41842	68437	92724	67791	21113	47124	28279	50647	09809	26717	48925	14686	24824	38530	62429	57330	33340	07994
40	28521	08035	30260	91407	04111	18581	84777	87116	96280	09202	31360	02923	83625	19821	35903	86927	36021	90593
41	85133	15310	42745	84831	82992	73756	67473	62066	83254	02735	55402	39765	92121	07338	39944	36882	74892	00148
42	28122	35506	71104	96492	90721	22225	23256	30415	63671	27160	19768	08441	38172	15357	73851	53381	20093	42073
43	56665	12467	44282	00817	58668	70312	66617	75720	93458	74491	72624	45673	68051	53523	58745	13730	93676	87636
44	19871	89889	70142	63766	71799	97398	23855	08350	11993	16729	23096	75940	45632	05786	46643	52563	30407	28338
45	48253	37932	79566	98774	02523	54942	15195	01354	03979	36909	21991	08828	45452	75565	90933	08713	36319	70259
46	80828	98357	85671	69918	30878	48784	81471	43729	60566	81014	68445	82593	59634	16601	05712	80642	26928	11496
47	09863	88615	26990	94808	32784	51992	60048	09830	75745	30593	64917	90209	55266	57533	68877	37486	91998	30055
48	05754	47499	53052	86074	01045	90121	12938	84746	55683	64345	22413	08513	04316	38192	73202	99160	56397	77063
49	32883	01773	11423	07799	12268	59983	60446	16744	12452	81457	56278	49040	31680	66267	05187	69329	28067	78017
50	82869	70040	36427	18798	57316	09565	11637	30597	11151	46114	30048	60952	48736	39133	79698	90272	80447	88785

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- **Random numbers**
- Use in sample selection
- Should we put it back?
- An example of sampling people from a list

- There's even a infamous book – "A Million Random Digits" by the RAND Corporation
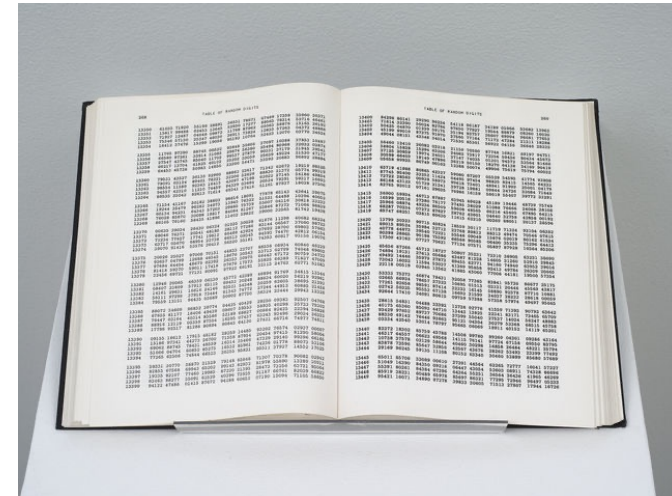
- **Random numbers**
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- There's even a infamous book – ''A Million Random Digits'' by the Rand Corporation

  - Particularly helpful in understanding this volume are the Amazon reviews --
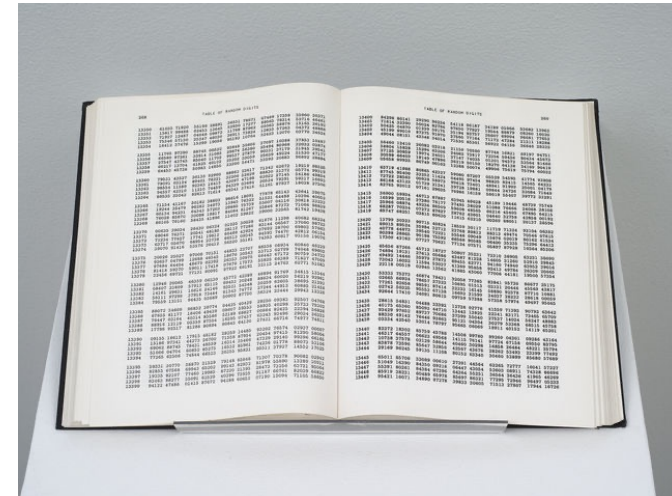
- **Random numbers**
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• **There's even a infamous book – "A Million Random Digits" by the Rand Corporation**

- From the *Freakonometrics* blog (http://freakonometrics.hypotheses.org/916 accessed September 2, 2016): "To whom do I write to report typographical errors? I noticed that the first "7" on the third line on page 48 should be a "3". The "7" that's printed there now isn't random. Other than that, this is really an excellent book."

- **Random numbers**
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- **There's even a infamous book – "A Million Random Digits" by the Rand Corporation**

  - **Or how about this one also from the *Freakonometrics* blog: "Such a terrific reference work! But with so many terrific random digits, it's a shame they didn't sort them, to make it easier to find the one you're looking for."**
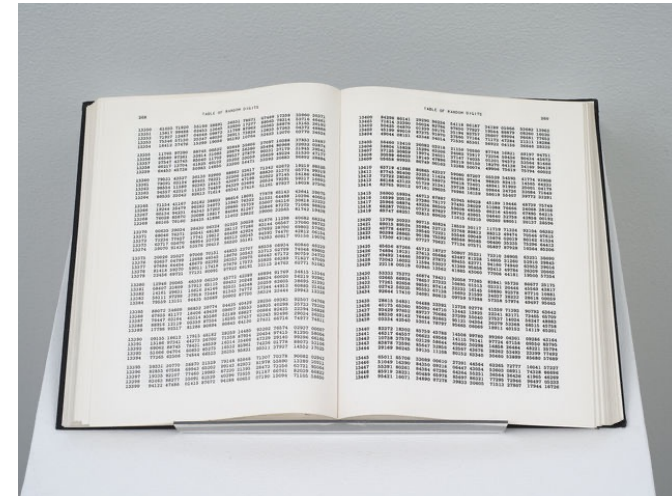
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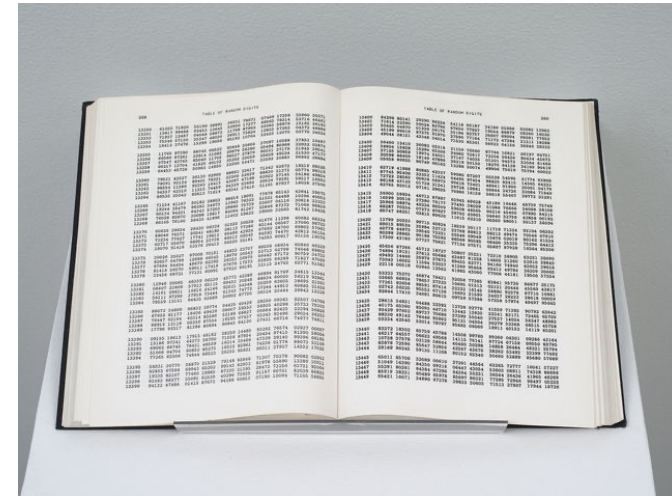- ## There's even a infamous book – "A Million Random Digits" by the Rand Corporation

  - And my favorite way of thinking about random numbers, from the *Freakonometrics* blog quote of Amazon reviews … "I took a class in statistics in college. I used this book to help me select random phone numbers for a poll I was conducting for my class project. (The most popular household cleanser in the greater Siouxland area is Bon Ami, by the way.) One of those phone calls was answered by the woman who is now my wife. We've been happily married for ten years! Thank you, RAND."

- Random numbers
- **Use in sample selection**
- Should we put it back?
- An example of sampling people from a list

• **Sample selection:**

frame – n = 370

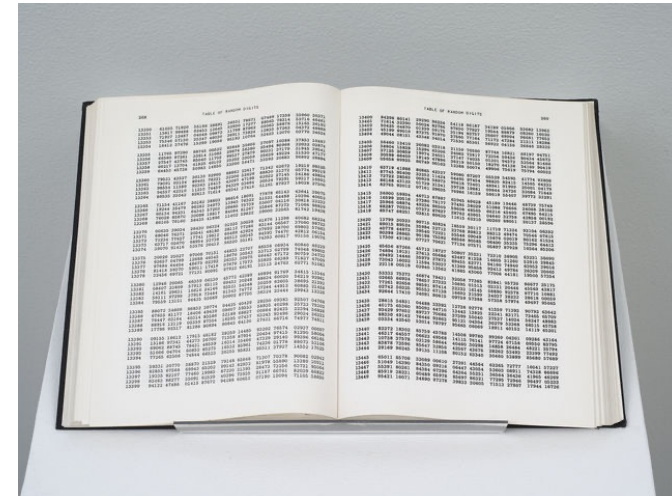| Seq. No.	ID	Division	Sex	Rank	Salary
1	38516070	Eng&Prof	m	3	$88
2	25428686	Medicine	f	3	$45
3	30318994	Medicine	m	3	$57
4	35886147	Medicine	m	1	$133
5	41416693	Eng&Prof	f	2	$71
6	60055684	Lit&SocSci	m	1	$113
7	76731882	Medicine	f	3	$65
8	51765248	Biol&Sci	m	3	$47
9	26471240	Lit&SocSci	f	3	$39
10	25864673	Biol&Sci	m	1	$74
11	23049573	Medicine	m	1	$88
12	12928113	Lit&SocSci	m	1	$62
13	13594590	Lit&SocSci	m	1	$49
14	20820530	Medicine	m	3	$88
15	52026919	Medicine	m	1	$181
16	59283042	Eng&Prof	m	3	$63
17	37941753	Medicine	m	2	$94
18	32498845	Eng&Prof	m	1	$91
19	42120123	Medicine	m	1	$60
20	83562743	Eng&Prof	m	3	$55
21	39834280	Biol&Sci	m	2	$55
22	60683602	Medicine	f	1	$106
23	18186559	Medicine	m	1	$116
24	20110594	Medicine	m	3	$79
25	61862981	Lit&SocSci	m	1	$61

- Random numbers
- **Use in sample selection**
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• Sample selection:

frame – n = 370

• Numbering:
  - 8-digit ID
  - Sequence no.

Seq. No.	ID	Division	Sex	Rank	Salary
1	38516070	Eng&Prof	m	3	$88
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18	32498845	Eng&Prof	m	1	$91
19	42120123	Medicine	m	1	$60
20	83562743	Eng&Prof	m	3	$55
21	39834280	Biol&Sci	m	2	$55
22	60683602	Medicine	f	1	$106
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5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
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15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
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21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
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9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers

- **Use in sample selection**

- Should we put it back?

- An example of sampling people from a list

• **Match random numbers (they come first) to list:**

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25329	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
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16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
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23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers

- **Use in sample selection**

- Should we put it back?

- An example of sampling people from a list

• Match random numbers (they come first) to list: 341

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25329	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
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16	98280	13316	23734	63720	50355
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25	61507	79038	38331	70320	73347

- Random numbers
- **Use in sample selection**
- Should we put it back?
- An example of sampling people from a list

• **Match random numbers (they come first) to list: 341**

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
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5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
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16	98280	13316	23734	63720	50355
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19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers

- **Use in sample selection**

- Should we put it back?

- An example of sampling people from a list

• **Match random numbers (they come first) to list:**

341

19

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25329	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers

- **Use in sample selection**

- Should we put it back?

- An example of sampling people from a list

• Match random numbers (they come first) to list:
341
  19

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25339	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers
- **Use in sample selection**
- Should we put it back?
- An example of sampling people from a list

• Match random numbers (they come first) to list:

341

19

253

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25329	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers

- **Use in sample selection**

- Should we put it back?

- An example of sampling people from a list

• Match random numbers (they come first) to list:

341

19

253

238

140

143

.

.

.

32

291

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01913	29119	72315	70334	98029
4	25339	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00681	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33601	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers

- Use in sample selection

- **Should we put it back?**

- An example of sampling people from a list

• **What if we get the same random number more than once in a sample?**

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25329	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
6	69419	03843	33691	19541	80307
7	14078	76539	08538	17888	65481
8	14339	07381	13958	46562	75860
9	97670	49015	97498	01260	63189
10	15279	11006	82780	74184	34105
11	97947	01993	12603	63485	16937
12	00631	55073	73183	05961	16402
13	30246	12514	24792	46736	61024
14	74016	75832	78113	18374	78851
15	53669	78559	66231	29085	78506
16	98280	13316	23734	63720	50355
17	32396	30527	10030	69065	87877
18	05708	99540	11289	09030	94001
19	04004	49911	47941	81165	14505
20	84424	61863	81655	87420	76149
21	84546	16063	09051	31787	57235
22	76882	00300	45868	17098	53385
23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers
- Use in sample selection
- **Should we put it back?**
- An example of sampling people from a list

- What if we get the same random number more than once in a sample?
- Keep it: with replacement selection (WR)
- Drop it: without replacement selection (WOR)

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25329	02138	52670	11692	03654
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23	98169	25789	99043	73890	35327
24	33621	78638	27009	29610	20171
25	61507	79038	38331	70320	73347

- Random numbers

- Use in sample selection

- **Should we put it back?**

- An example of sampling people from a list

- What if we get the same random number more than once in a sample?
- Keep it: with replacement selection (WR)
- Drop it: without replacement selection (WOR)
- Preference: drop it – better results

	1-5	6-10	11-15	16-20	21-25
1	57982	03250	09488	12085	38325
2	34104	88576	32549	09603	73860
3	01943	29119	72315	70334	98029
4	25329	02138	52670	11692	03654
5	23869	85541	29993	57693	84597
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23	98169	25789	99043	73890	35327
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- Random numbers

- Use in sample selection

- Should we put it back?

- **An example of sampling people from a list**

• **Back to the sample …**

No.	Seq. No.
1	341
2	19
3	253
4	238
5	140
6	143
7	152
8	6
9	302
10	323
11	57
12	40
13	336
14	209
15	83
16	346
17	184
18	85
19	129
20	226

- Random numbers
- Use in sample selection
- Should we put it back?
- **An example of sampling people from a list**

• Back to the sample …

• And results – a mean

No.	Seq. No.	Income
1	341	42
2	19	60
3	253	134
4	238	80
5	140	148
6	143	57
7	152	37
8	6	113
9	302	89
10	323	81
11	57	64
12	40	60
13	336	41
14	209	44
15	83	109
16	346	106
17	184	87
18	85	47
19	129	102
20	226	71
Sum		1572
Mean		78.6

Unit 1

- 1 Research designs ...
- 2 Surveys
- 3 Why sample?
- 4 Why randomize?
- **5 Types of sampling**
- 6 Evaluating samples
- 7 Units sampled

- **Unit 1: Sampling as a research tool**
  - Lecture 1 – Research design & sampling
  - Lecture 2 – Surveys & sampling
  - Lecture 3 -- Why sample at all?
  - Lecture 4 – Why might we randomize, and how do we do it?
  - **Lecture 5 – What happens when we randomize?**
  - Lecture 6 – How do we evaluate how good the sample is?
  - Lecture 7 – What kinds of things can we sample?

- **Unit 2: Mere randomization**

- **Unit 3: Saving money**

- **Unit 4: Being more efficient**

- **Unit 5: Simplifying sampling**

- **Unit 6: Some extensions & applications**