Statistical Inference (Section A01)
CRN 21827

Tables of Random Digits

In the Olden Days (that's to say, before we all had our own personal computers) if you wanted to undertake simple random sampling you had to make use of published tables of random digits. Someone else owned the big, expensive mainframe computer, and they generated the numbers and then made them available to us mere mortals. The best known compilation of such digits was the book, *A Million Random Digits With 100,000 Normal Deviates*, published by the Rand Corporation.

The first page of the table of random digits in the book began like this:

00000	10097	32533	76520	13586	34673	54876	80959	09117	39292	74945
00001	37542	04805	64894	74296	24805	24037	20636	10402	00822	91665
00002	08422	68953	19645	09303	23209	02560	15953	34764	35080	33606
00003	99019	02529	09376	70715	38311	31165	88676	74397	04436	27659
00004	12807	99970	80157	36147	64032	36653	98951	16877	12171	76833
00005	66065	74717	34072	76850	36697	36170	65813	39885	11199	29170
00006	31060	10805	45571	82406	35303	42614	86799	07439	23403	09732
00007	85269	77602	02051	65692	68665	74818	73053	85247	18623	88579
00008	63573	32135	05325	47048	90553	57548	28468	28709	83491	25624
00009	73796	45753	03529	64778	35808	34282	60935	20344	35273	88435
00010	98520	17767	14905	68607	22109	40558	60970	93433	50500	73998
00011	11805	05431	39808	27732	50725	68248	29405	24201	52775	67851
00012	83452	99634	06288	98083	13746	70078	18475	40610	68711	77817
00013	88685	40200	86507	58401	36766	67951	90364	76493	29609	11062
00014	99594	67348	87517	64969	91826	08928	93785	61368	23478	34113
00015	65481	17674	17468	50950	58047	76974	73039	57186	40218	16544
00016	80124	35635	17727	08015	45318	22374	21115	78253	14385	53763
00017	74350	99817	77402	77214	43236	00210	45521	64237	96286	02655
00018	69916	26803	66252	29148	36936	87203	76621	13990	94400	56418
00019	09893	20505	14225	68514	46427	56788	96297	78822	54382	14598
00020	91499	14523	68479	27686	46162	83554	94750	89923	37089	20048
00021	80336	94598	26940	36858	70297	34135	53140	33340	42050	82341
00022	44104	81949	85157	47954	32979	26575	57600	40881	22222	06413
00023	12550	73742	11100	02040	12860	74697	96644	89439	28707	25815
00024	63606	49329	16505	34484	40219	52563	43651	77082	07207	31790
00025	61196	90446	26457	47774	51924	33729	65394	59593	42582	60527
00026	15474	45266	95270	79953	59367	83848	82396	10118	33211	59466
00027	94557	28573	67897	54387	54622	44431	91190	42592	92927	45973
00028	42481	16213	97344	08721	16868	48767	03071	12059	25701	46670
00029	23523	78317	73208	89837	68935	91416	26252	29663	05522	82562
00030	04493	52494	75246	33824	45862	51025	61962	79335	65337	12472
00031	00549	97654	64051	88159	96119	63896	54692	82391	23287	29529
00032	35963	15307	26898	09354	33351	35462	77974	50024	90103	39333
00033	59808	08391	45427	26842	83609	49700	13021	24892	78565	20106
00034	46058	85236	01390	92286	77281	44077	93910	83647	70617	42941
00035	32179	00597	87379	25241	05567	07007	86743	17157	85394	11838

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(*etc*.)

Note that the first column just gives the row number. Remember, there are going to be lots of rows in the entire book, because there are a million random digits, so the row number is given to five digits.

The random digits themselves (which begin from the left end of the row 00001) are 1, 0, 0, 9, 7, 7, 3, 2, 5, 3, 3, 7, 6, 5, ……. The numbers are presented in five-digit blocks, simply for ease of reading – the Rand Corp. didn't want to encourage law-suits from people whose eyesight was destroyed by browsing the book before going to sleep at night!

The way you'd use the tables was as follows:

1. Open the book at an arbitrary page.
2. Select any line of the table on that page.
3. Read off the successive digits from left to right (or from right to left) on that line.
4. If you got to the end of the line (the right end, say) and needed more digits, just move to the beginning of the next line (the left end in this case) and keep going.
5. If you got to the bottom of the page, just carry on in the same way on the next page.

Problem 1:
Select $n = 4$ items at random from a population of $N = 9$ items.

Solution:
I've chosen the 3rd line of the above table, *quite arbitrarily*. So the string of digits, starting from the left (my choice, again), is: 99019 02529 09376 70715.

I'd number the populations from "0" to "8", to uniquely identify all 9 of them. Using the string of numbers above, I'd then select items "0", "1", "2", and "5" to go into my sample of size $n = 4$. Notice that I've skipped the values "9", as I'm only using the digits from zero to eight; and if I encounter a digit I've used already, I skip that digit and move on.

Note that I could have numbered the population items from "1" to "9", and then, using the same line from the table, I'd end up selecting items "9", "1", "2" and "5" to go into my (different) sample.

Problem 2:
Select $n = 5$ items from a population of $N = 2{,}500$

Solution:
This time I'm going to label the items from "1" to "2500" and use the 23rd line of the above table:

12550 73742 11100 02040 12860 74697 96644 89439 28707 25815

Can you see why my selected sample comprises items: "1255", "(0)737", "1000", "2040", and "1286"?

Aren't you glad that we have our own computers and statistical/econometric software?

You'll no doubt be delighted to learn that the book, *A Million Random Digits With 100,000 Normal Deviates*, is available on Amazon.com, here.

As is generally the case with their listed books, Amazon has published numerous reviews by past readers of this book. In this particular case, there are reviews from people who seem to have a decent sense of humour. For example:

- "*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.*"

- "*Does anybody know about a German translation of this book? I really would be glad, if I can get it in German.*"

- "*Wow! The 1,000,000 random digits produced by the Rand Corporation are some of the best random digits out there! I was amazed at some of their selections.*"

- "*To whom do I write to report typographical errors? I noticed that the first "7" on the third line 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.*"

- *Critics and audiences are hailing the restoration of this now cult-classic. The stream of consciousness writing style that Dr. Rand pioneered in this daring work was soon picked up by Jack Kerouac and other writers of the beat generation. One can't help but visualize the thick haze of cigarette smoke and booze as Rand would read aloud his digits to a mesmerizing bongo drum beat.……*

- "*Have you Random Digits fans heard the great news? It looks like Universal has picked up the rights to the book and they've already begun production on the film adaptation!* "

  "*The rumor mill suggests that Brad Pitt is going to star as, you guessed it,27473, and Maggie Gyllenhaal is lined up to play 70690. Other stars that are signed include Heath Ledger as the diabolical 91437 and there are some rumors that Robert DeNiro will put in a brief cameo as 22941. The project is going to be directed by Quinten Tarantino, which is why production of his next movie, Grind House, suddenly stopped early this summer. He was obviously focusing on adapting Random Digits for the big screen.*

  Expect this one to be the biggest hit of 2007. Forget Spiderman 3, that only contains one digit that was deliberately picked. A Million Random Digits with 100,000 Normal Deviates will kill it at the box office."