

**ENE 3031 - Fall 2014**  
**Homework 4**  
**due Wednesday Oct/15**

1. The cdf of a discrete random variable  $X$  is given by

$$F(x) = \frac{x(x+1)(2x+1)}{n(n+1)(2n+1)}, \quad x = 1, 2, \dots, n \quad (1)$$

When  $n = 4$ , generate values of  $X$ , using  $U_1 = 0.83$ ,  $U_2 = 0.24$ , and  $U_3 = 0.57$ .

2. The weekly demand  $X$  for a slow-moving item has been found to be approximated well by a geometric distribution on the range  $\{0, 1, 2, \dots\}$  with mean weekly demand of 2.5 items. Generate 10 values of  $X$  demand per week, using random numbers in the next page.
3. A machine is taken out of production either if it fails or after 5 hours, whichever comes first. By running similar machines until failure, it has been found that time to failure  $X$  has the Weibull distribution with  $\alpha = 8$  and  $\beta = 0.75$  (the location parameter is set to  $\nu = 0$ ). The time until the machine is taken out of production can be represented as  $Y$ . Develop a step-by-step procedure for generating  $Y$ .
4. Develop an acceptance-rejection technique for generating a geometric random variable  $X$ .
5. Develop an acceptance-rejection technique for generating a random variable from a distribution with pdf  $f(x) = 3x^2$ ,  $0 \leq x \leq 1$ .
6. Ten observations of machine repair times have been collected to be used in a simulation. The data are

$$1.32, 2.44, 1.01, 0.54, 3.26, 5.84, 3.29, 0.76, 5.42, 4.65 \quad (2)$$

Develop an inverse transform technique for generating machine repair times. Find repair times if  $U_1 = 0.24$  and  $U_2 = 0.35$ .

Table A.1 Random Digits and Random Numbers

94737	08225	35614	24826	88319	05595	58701	57365	74759
87259	85982	13296	89326	74863	99986	68558	06391	50248
63856	14016	18527	11634	96908	52146	53496	51730	03500
66612	54714	46783	61934	30258	61674	07471	67566	31635
30712	58582	05704	23172	86689	94834	99057	55832	21012
69607	24145	43886	86477	05317	30445	33456	34029	09603
37792	27282	94107	41967	21425	04743	42822	28111	09757
01488	56680	73847	64930	11108	44834	45390	86043	23973
66248	97697	38244	50918	55441	51217	54786	04940	50807
51453	03462	61157	65366	61130	26204	15016	85665	97714
92168	82530	19271	86999	96499	12765	20926	25282	39119
36463	07331	54590	00546	03337	41583	46439	40173	46455
47097	78780	04210	87084	44484	75377	57753	41415	09890
80400	45972	44111	99708	45935	03694	81421	60170	58457
94554	13863	88239	91624	00022	40471	78462	96265	55360
31567	53597	08490	73544	72573	30961	12282	97033	13676
07821	24759	47266	21747	72496	77755	50391	59554	31177
09056	10709	69314	11449	40531	02917	95878	74587	60906
19922	37025	80731	26179	16039	01518	82697	73227	13160
29923	02570	80164	36108	73689	26342	35712	49137	13482
29602	29464	99219	20308	82109	03898	82072	85199	13103
94135	94661	87724	88187	62191	70607	63099	40494	49069
87926	34092	34334	55064	43152	01610	03126	47312	59578
85039	19212	59160	83537	54414	19856	90527	21756	64783
66070	38480	74636	45095	86576	79337	39578	40851	53503
78166	82521	79261	12570	10930	47564	77869	16480	43972
94672	07912	26153	10531	12715	63142	88937	94466	31388
56406	70023	27734	22254	27685	67518	63966	33203	70803
67726	57805	94264	77009	08682	18784	47554	59869	66320
07516	45979	76735	46509	17696	67177	92600	55572	17245
43070	22671	00152	81326	89428	16368	57659	79424	57604
36917	60370	80812	87225	02850	47118	23790	55043	75117
03919	82922	02312	31106	44335	05573	17470	25900	91080
46724	22558	64303	78804	05762	70650	56117	06707	90035
16108	61281	86823	20286	14025	24909	38391	12183	89393
74541	75808	89669	87680	72758	60851	55292	95663	88326
82919	31285	01850	72550	42986	57518	01159	01786	98145
31388	26809	77258	99360	92362	21979	41319	75739	98082
17190	75522	15687	07161	99745	48767	03121	20046	28013
00466	88068	68631	98745	97810	35886	14497	90230	69264

To get a random number between 0 and 1, take a grouping of digits, for example 5 at a time, and place a decimal point in front.