MATH 1342

Section 6.3

Simulating Experiments

Simulation is the imitation of a chance behavior based on a model that reflects an experiment.

Examples:

1. Mudlark Airlines has a 15-seater commuter turboprop that is used for short flights. Their data suggest that on average about 8% of the customers who buy tickets are no-shows. Wanting to avoid empty seats (they see this as missed opportunity to increase revenue), they decide to sell 17 tickets for each flight. Ticketed customers who cannot be seated on the plane will be accommodated on another flight and will receive a certificate good for a free flight at another time. You have been retained as a consultant to Mudlark. Your job is to determine if this particular overbooking is sound strategy. Use simulation methods to perform your analysis. Explain your solution completely, and write your recommendation to the company on whether this policy is good for the company or whether it should be adjusted.

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Random Number Table: Digits: 0 – 91: Customer showed up; Digits 92-99: Customer did not show up.
Pick a line to begin the experiment.
See how many customers “showed up” out of 17 tickets sold.
Did the company make money or not?

2. Joey is interested in investigating streaks when flipping coins. He wants to use simulation methods to determine the longest run of heads, on average, for 20 consecutive coin flips.

a. Describe a correspondence between random digits from a random digit table and outcomes.
b. What will constitute one repetition in this simulation?
c. Starting with line 101 in the random digit table, carry out 10 repetitions and record the longest run of heads for each repetition.
d. What is the mean run length for the 10 repetitions?

Line								
101	98360	26534	47384	94612	88666	14170	10847	05567
102	55556	59863	86607	00094	77213	35711	52851	42108
103	31634	15399	73476	77412	06186	16636	54307	14947
104	13785	11509	54891	98375	68377	50572	08453	80376
105	80376	73842	95465	59746	38078	25727	78502	95324
106	21198	99781	53374	25595	12153	54228	13068	71757
107	80376	55998	80011	27276	24076	64905	48638	06309
108	16471	13043	46268	11552	66491	90332	84523	06067
109	20100	75610	98212	02800	96139	39206	35402	77700
110	05779	74579	89171	07523	52255	26470	03838	54922
111	62351	50130	07783	25087	98624	36239	98874	93376
112	07965	89754	96881	98455	94642	72528	12427	65076
113	61372	26590	75157	57974	20862	66909	88860	00930
114	44298	42747	42193	12999	83264	09368	37378	20830
115	55526	20038	12219	86208	07484	37662	54756	36799
116	18383	07966	51951	02466	17759	12817	95865	79200
117	88229	14407	53248	94458	93869	03857	38378	69802
118	66837	20695	77142	97242	27779	90886	37570	17219
119	06339	43041	89297	00653	49434	11598	86545	10981
120	89716	62712	45056	53678	31861	28914	92098	78686

Another Example:

It has been determined that 20% of students do not have scheduled classes one day of out the week. A university is considering to sell 25 parking permits for a parking lot with only 20 spaces to account for this. This practice will go into effect if a simulated experiment has less than 2 students unable to park their car.

How would you assign random digits for this situation?

98360	26534	47384	94612	88666	14170	10847	05567

Simulate the experiment using the first 25 digits from this line of the random digit table:

Should the university go ahead with this practice?

If another line of the Random Digit Table were used, would these results be the same?