

Math 206 - Quiz 4

September 29, 2010

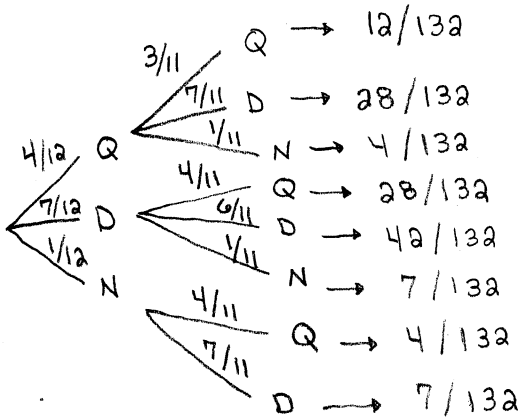
Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (2 points) A jar contains 4 quarters, 7 dimes, and 1 nickel. Two coins are selected at random without replacement.

(a) What is the expected value?



Value	Probability
50¢	12/132
35¢	28/132 + 28/132 = 56/132
30¢	4/132 + 4/132 = 8/132
20¢	42/132
15¢	7/132 + 7/132 = 14/132

EXPECTED VALUE =

$$(50¢) \left(\frac{12}{132} \right) + (35¢) \left(\frac{56}{132} \right) + (30¢) \left(\frac{8}{132} \right) + (20¢) \left(\frac{42}{132} \right) + (15¢) \left(\frac{14}{132} \right) = \underline{\underline{29.1\bar{6}¢}}$$

(b) What are the odds in favor of selecting more than 30 cents?

PROBABILITY IS $\frac{12}{132} + \frac{56}{132} = \frac{68}{132}$

ODDS ARE $\frac{\frac{68}{132}}{1 - \frac{68}{132}} = \frac{68}{64}$

2. (1 point) Design a game at which you could win \$100, \$10, or \$1, each with a different probability. If your game is to be fair, how much should it cost to play?

CHOOSE A CARD FROM A STANDARD DECK.

ACE OF HEARTS PAYS \$100 PROB IS $\frac{1}{52}$

FACE CARD PAYS \$10 PROB IS $\frac{12}{52}$

ANYTHING ELSE PAYS \$1 PROB IS $\frac{39}{52}$

FAIR GAME \Leftrightarrow

COST = EXPECTED VALUE

TO BE FAIR, THE GAME

SHOULD COST

\$4.981

EXPECTED VALUE =

$$(\$100) \left(\frac{1}{52} \right) + (\$10) \left(\frac{12}{52} \right) + (\$1) \left(\frac{39}{52} \right) \approx \$4.981$$

3. (2 points) Design a simulation that could be used to estimate the solution of the following problem.

Collectors estimate that the probability of getting a rare Cyclops Bean in a single package of Mighty Beans is 0.10. If a collector buys 7 packages, what is the probability that the collector gets two or more Cyclops Beans?

Perform ten trials of your simulation and use your results to estimate the probability.

USE A RANDOM DIGIT TABLE.

SELECT ONE STRING OF 7 DIGITS
TO REPRESENT ONE TRIAL.

SINCE THE CYCLOPS BEAN HAS
PROB 10%, WE'LL LET THAT
BEAN CORRESPOND TO A SINGLE
DIGIT. LET'S SAY 0 = CYCLOPS BEAN.
A SUCCESS IS TWO OR MORE ZEROS IN A TRIAL.

STARTING IN OUR TABLE AT ROW 11,
COLUMN 4...

TRIAL	7 DIGITS	SUCCESS
1	3637293	No
2	5587571	No
3	2138302	No
4	5460637	No
5	4665121	No
6	7810741	No
7	5836284	No
8	9816045	No
9	8161949	No
10	2403809	Yes

BASED ON THE SIMULATION, THE
PROBABILITY IS APPROXIMATELY

$$\frac{1}{10}$$

Random Number Table

13962	70992	65172	28053	02190	83634	66012	70305	66761	88344
43905	46941	72300	11641	43548	30455	07686	31840	03261	89139
00504	48658	38051	59408	16508	82979	92002	63606	41078	86326
61274	57238	47267	35303	29066	02140	60867	39847	50968	96719
43753	21159	16239	50595	62509	61207	86816	29902	23395	72640
83503	51662	21636	68192	84294	38754	84755	34053	94582	29215
36807	71420	35804	44862	23577	79551	42003	58684	09271	68396
19110	55680	18792	41487	16614	83053	00812	16749	45347	88199
82615	86984	93290	87971	60022	35415	20852	02909	99476	45568
05621	26584	36493	63013	68181	57702	49510	75304	38724	15712
06936	37293	55875	71213	83025	46063	74665	12178	10741	58362
84981	60458	16194	92403	80951	80068	47076	23310	74899	87929
66354	88441	96191	04794	14714	64749	43097	83976	83281	72038
49602	94109	36460	62353	00721	66980	82554	90270	12312	56299
78430	72391	96973	70437	97803	78683	04670	70667	58912	21883
33331	51803	15934	75807	46561	80188	78984	29317	27971	16440
62843	84445	56652	91797	45284	25842	96246	73504	21631	81223
19528	15445	77764	33446	41204	70067	33354	70680	66664	75486
16737	01887	50934	43306	75190	86997	56561	79018	34273	25196
99389	06685	45945	62000	76228	60645	87750	46329	46544	95665
36160	38196	77705	28891	12106	56281	86222	66116	39626	06080
05505	45420	44016	79662	92069	27628	50002	32540	19848	27319
85962	19758	92795	00458	71289	05884	37963	23322	73243	98185
28763	04900	54460	22083	89279	43492	00066	40857	86568	49336
42222	40446	82240	79159	44168	38213	46839	26598	29983	67645
43626	40039	51492	36488	70280	24218	14596	04744	89336	35630
97761	43444	95895	24102	07006	71923	04800	32062	41425	66862
49275	44270	52512	03951	21651	53867	73531	70073	45542	22831
15797	75134	39856	73527	78417	36208	59510	76913	22499	68467
04497	24853	43879	07613	26400	17180	18880	66083	02196	10638
95468	87411	30647	88711	01765	57688	60665	57636	36070	37285
01420	74218	71047	14401	74537	14820	45248	78007	65911	38583
74633	40171	97092	79137	30698	97915	36305	42613	87251	75608
46662	99688	59576	04887	02310	35508	69481	30300	94047	57096
10853	10393	03013	90372	89639	65800	88532	71789	59964	50681
68583	01032	67938	29733	71176	35699	10551	15091	52947	20134
75818	78982	24258	93051	02081	83890	66944	99856	87950	13952
16395	16837	00538	57133	89398	78205	72122	99655	25294	20941
53892	15105	40963	69267	85534	00533	27130	90420	72584	84576
66009	26869	91829	65078	89616	49016	14200	97469	88307	92282
45292	93427	92326	70206	15847	14302	60043	30530	57149	08642
34033	45008	41621	79437	98745	84455	66769	94729	17975	50963
13364	09937	00535	88122	47278	90758	23542	35273	67912	97670
03343	62593	93332	09921	25306	57483	98115	33460	55304	43572
46145	24476	62507	19530	41257	97919	02290	40357	38408	50031
37703	51658	17420	30593	39637	64220	45486	03698	80220	12139
12622	98083	17689	59677	56603	93316	79858	52548	67367	72416
56043	00251	70085	28067	78135	53000	18138	40564	77086	49557
43401	35924	28308	55140	07515	53854	23023	70268	80435	24269
18053	53460	32125	81357	26935	67234	78460	47833	20496	35645

From The Rand Corporation, *A Million Random Digits with 100,000 Normal Deviates* (New York: The Free Press, 1955), by permission.