

EXAM I

NAME _____

- You must show your work in order to receive full credit.
 - Please label your work clearly.
 - Use three decimal places for calculations.
 - For all probability calculations, be sure to include the statement of what you are calculating. (i.e. $P(A \cap B) = \dots$, $P(A \cup B) = \dots$, etc)
1. A certain internet service provider requires user names to be 7 characters long. The first 3 characters must be upper case letters (from A to Z), and the remaining 4 must be digits (from 0 to 9). An example of user name: ABA1334.
 - (a) (5pts) How many different user name are possible?
 - (b) (5pts) If the character must be different, (an example: ABC1234) how many different user names are possible?
 2. (5pts) From a pool of 25 candidates, in how many different ways can be filled for 5 officers?

3. The ages of 10 randomly selected employees at a certain technical consulting firm are:
(Hint: $\sum_{i=1}^{10} x_i^2 = 12560$)

25, 31, 27, 42, 23, 54, 26, 34, 48, 30

- (a) (5pts) Construct a stem-and-leaf display.
- (b) (4pts) What is the first quartile, median, and third quartile of the sample?
- (c) (4pts) Construct a boxplot for this dataset.
- (d) (5pts) Compute the sample mean and variance.

- (e) (4pts) We realized that 54 is mistyped and original value was 540, so wanted to remove the maximum and minimum values and calculate $a\%$ trimmed mean. What is the number a and the value of trimmed mean?
4. One in five people in the US own individual stocks. consider a random sample of 15 people.
- (a) (4pts) Find the probability that the number of owning individual stocks is exactly four.
- (b) (4pts) Find the probability that the number of owning individual stocks is more than three.
- (c) (4pts) Find the expected value, variance, and standard deviation of the number of people who own individual stocks in the sample.

5. The three major options on a certain type of a new car are an automatic transmission (A), a sunroof (B), and a stereo with compact disc player (C). If 70% of all purchasers request A, 80% request B, 75% request C, 85% request A or B, 90% request A or C, 95% request B or C, and 98% request A or B or C. Compute the following probabilities and draw the ven diagram.

(a) (4pts) Draw the venn diagram of the three events and sample space filled with probabilities.

(b) (3pts) The next purchaser will request at least one of the three options.

(c) (3pts) The next purchaser will select none of the three options.

(d) (3pts) The next purchaser will request only an automatic transmission and not either of the other two options.

(e) (3pts) The next purchaser will select exactly on of these three options.

- (f) (3pts) Compute the conditional probability of requesting and automatic transmission given that the next purchaser requests a sunroof.
- (g) (3pts) Are the events A and B independent? How do you know?
6. Seventy five percent of the light air craft that disappear while in flight in a certain country are subsequently discovered. Of the aircraft that are discovered, 65% have an emergency locator, where as 95% of the aircraft not discovered do not have such a locator. Suppose a light aircraft has disappeared.
- (a) (5pts) If it has an emergency locator, what is the probability that it will not be discovered?
- (b) (5pts) If it does not have an emergency locator, what is the probability that it will be discovered?

7. A homeowner finds the following probability distribution for number of pieces of mail she receives on any given delivery day: variable X shown here :

Number	1	2	3	4	5	6
Probability	0.1	0.1	0.2	0.2	0.3	0.1

(a) (5pts) Find the cumulative distribution function.

(b) (4pts) Find the mean.

(c) (4pts) Find the variance.

8. (3 pts) If two events are independent, then they are also mutually exclusive. Circle one and correct if false, and explain if true.

TRUE

or

FALSE

9. (3 pts) If a histogram which is skewed to the right has 50 as a median, the mean value of this data will be same as the median. Circle one and correct if false, and explain if true.

TRUE

or

FALSE

Be the change that you wish to see in the world. – Mahatma Gandhi

Table A.1 Cumulative Binomial Probabilities**a. $n = 5$**

$$B(x; n, p) = \sum_{y=0}^x b(y; n, p)$$

		<i>p</i>														
		0.01	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.70	0.75	0.80	0.90	0.95	0.99
<i>x</i>	0	.951	.774	.590	.328	.237	.168	.078	.031	.010	.002	.001	.000	.000	.000	.000
	1	.999	.977	.919	.737	.633	.528	.337	.188	.087	.031	.016	.007	.000	.000	.000
	2	1.000	.999	.991	.942	.896	.837	.683	.500	.317	.163	.104	.058	.009	.001	.000
	3	1.000	1.000	1.000	.993	.984	.969	.913	.812	.663	.472	.367	.263	.081	.023	.001
	4	1.000	1.000	1.000	1.000	.999	.998	.990	.969	.922	.832	.763	.672	.410	.226	.049

b. $n = 10$

		<i>p</i>														
		0.01	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.70	0.75	0.80	0.90	0.95	0.99
<i>x</i>	0	.904	.599	.349	.107	.056	.028	.006	.001	.000	.000	.000	.000	.000	.000	.000
	1	.996	.914	.736	.376	.244	.149	.046	.011	.002	.000	.000	.000	.000	.000	.000
	2	1.000	.988	.930	.678	.526	.383	.167	.055	.012	.002	.000	.000	.000	.000	.000
	3	1.000	.999	.987	.879	.776	.650	.382	.172	.055	.011	.004	.001	.000	.000	.000
	4	1.000	1.000	.998	.967	.922	.850	.633	.377	.166	.047	.020	.006	.000	.000	.000
	5	1.000	1.000	1.000	.994	.980	.953	.834	.623	.367	.150	.078	.033	.002	.000	.000
	6	1.000	1.000	1.000	.999	.996	.989	.945	.828	.618	.350	.224	.121	.013	.001	.000
	7	1.000	1.000	1.000	1.000	1.000	.998	.988	.945	.833	.617	.474	.322	.070	.012	.000
	8	1.000	1.000	1.000	1.000	1.000	1.000	.998	.989	.954	.851	.756	.624	.264	.086	.004
	9	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.999	.994	.972	.944	.893	.651	.401	.096

c. $n = 15$

		<i>p</i>														
		0.01	0.05	0.10	0.20	0.25	0.30	0.40	0.50	0.60	0.70	0.75	0.80	0.90	0.95	0.99
<i>x</i>	0	.860	.463	.206	.035	.013	.005	.000	.000	.000	.000	.000	.000	.000	.000	.000
	1	.990	.829	.549	.167	.080	.035	.005	.000	.000	.000	.000	.000	.000	.000	.000
	2	1.000	.964	.816	.398	.236	.127	.027	.004	.000	.000	.000	.000	.000	.000	.000
	3	1.000	.995	.944	.648	.461	.297	.091	.018	.002	.000	.000	.000	.000	.000	.000
	4	1.000	.999	.987	.836	.686	.515	.217	.059	.009	.001	.000	.000	.000	.000	.000
	5	1.000	1.000	.998	.939	.852	.722	.403	.151	.034	.004	.001	.000	.000	.000	.000
	6	1.000	1.000	1.000	.982	.943	.869	.610	.304	.095	.015	.004	.001	.000	.000	.000
	7	1.000	1.000	1.000	.996	.983	.950	.787	.500	.213	.050	.017	.004	.000	.000	.000
	8	1.000	1.000	1.000	.999	.996	.985	.905	.696	.390	.131	.057	.018	.000	.000	.000
	9	1.000	1.000	1.000	1.000	.999	.996	.966	.849	.597	.278	.148	.061	.002	.000	.000
	10	1.000	1.000	1.000	1.000	1.000	.999	.991	.941	.783	.485	.314	.164	.013	.001	.000
	11	1.000	1.000	1.000	1.000	1.000	1.000	.998	.982	.909	.703	.539	.352	.056	.005	.000
	12	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.996	.973	.873	.764	.602	.184	.036	.000
	13	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.995	.965	.920	.833	.451	.171	.010
	14	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	.995	.987	.965	.794	.537	.140

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