

MATH 333A: Probability & Statistics. **Examination #1** (Spring 2008)

Score

February 20, 2008 NJIT

Name:	Student ID:	Section #
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Instructors : R. Dios, A. Jain, and V. Venkateswaran

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➔ **Must show all steps for each problem to receive full credit.**

I pledge my honor that I have abided by the Honor System. _____

1. A certain delivery service offers express and standard delivery options for sending parcels. Based on the past records, 75% of the parcels are sent by standard delivery and 25% by express delivery. Of those sent by standard delivery, 60% arrive the next day and of those sent by express delivery, 95% arrive the next day. A record of a parcel is chosen at random from the delivery service's files. What is the probability that the parcel corresponding to this record:
 - a. Was shipped by express delivery and arrived the next day? (7 pts)
 - b. Arrived the next day? (7 pts)
 - c. Was sent by express delivery given that this parcel arrived the next day? (6 pts)

2. A recent newspaper article states that 40% of the major U.S. companies electronically monitor their employees. If 6 major U.S. companies are selected at random, find the probability that:
 - a. At most two of these 6 companies monitor their employees electronically. (7 pts)
 - b. All 6 companies monitor their employees electronically. (7 pts)
 - c. None of the 6 companies monitor their employees electronically. (6 pts)

3. The National Muffler Company claims it will change your muffler in less than 30 minutes. An undercover consumer reporter monitored a random sample of 30 muffler changes at a National outlet. The data on the time in minutes to change a muffler are reported below:

54	12	22	31	26	22	30	26	18	28	12	40	17	13	14
17	25	29	15	30	10	28	16	33	24	20	29	34	23	13

- a. Construct a box plot for the above data. (7 pts)
- b. Draw conclusions about the distribution of time to change the muffler (e.g., shape and presence of any outliers). (7 pts)
- c. Find the mean and variance of the time to change the muffler. (6 pts)

Hint: $\sum X = 711$ and $\sum X^2 = 19,527$.

4. A researcher collected the following data on the number of ounces of silver per ton of ore for two mines.

Mine A:	50	52	56	57	55	59	60	61	60	62	63	64	66	67	68	75	88	91	99
Mine B:	39	43	44	46	47	49	50	52	53	54	55	56	58	59	62	63	64	65	66

- a. Construct a stem-and-leaf display for each mine. (10 pts)
 - b. Compare the two displays and draw conclusions about the probability distributions of the ounces of silver per ton of ore and describe any similarities and/or differences. (10 pts)
5. An encryption-decryption system for sending messages consists of three elements: encode(E), transmit(T), and decode(D) (i.e., this is a series system in E, T, and D). The probability of error is 5%, 10%, and 1% for E, T, and D, respectively. You may assume that for any message, the 3 types of error occur independently. What is the probability that a message:
- a. Is completely error-free? (10 pts)
 - b. Has either an encode error or a decode error? (10 pts)

END