MIDTERM EXAM (ver 2)

STA 110E
Brani Vidakovic
Wed 10/28/1998.

Name _____

ID number _____

Notes:

1. This is an open book and open notes exam.
2. You must show your work and explain your answer in order to receive credit.
3. The exam carries 100 points.
4. The points assigned to each problem are indicated at the beginning of that problem. Use them to plan your time. You have 75 minutes to finish.
5. The exam has 5 problems.

Problem	1	2	3	4	5	Total
Score	/20	/20	/20	/20	/20	/100

1. [20 pts] **Toxic Emissions.** The total toxic emissions reported by the EPA for ten counties in the United States are reported below. Data are in millions of pounds.

5200	612	581	512	423	404	349	329	309	284

(a) Find the *five-number summary* for the above data.

(b) Find the sample mean and sample standard deviation for the last 4 measurements: 349, 329, 309, 284.

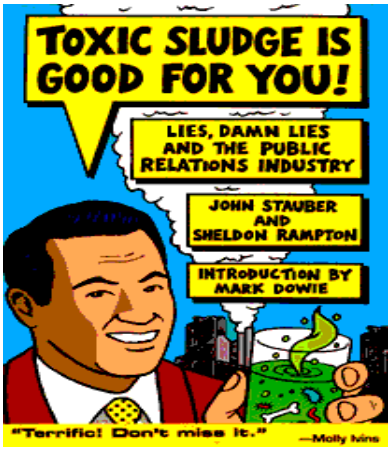

Figure 1: Toxic Emissions

2. [20 pts] **Weapons at Airports.** A recent test conducted by the Federal Aviation Administration found that guards hired to screen passengers for weapons at the boarding gate had a very poor rate of detection. The detection rates for weapons carried by F.A.A. inspectors or placed in their carry-on-luggage averaged 80%, but their rates varied from 34% to 99% for the airports tested (*New York Times,* June 18, 1987). Suppose that in a particular city, airport **A** handles 50% of all airline traffic, while airports **B** and **C** handle 30% and 20%, respectively. The detection rates at the three airports are 0.9, 0.5, and 0.4, respectively. If the passenger at one of the airports is found to be carrying a weapon through the boarding gate, what is the probability that the passenger is not using the airport **C**?

3. [20 pts] **Spontaneous Recovery.** Twenty percent of individuals who seek psychotherapy will exhibit a return to normal personality irrespective of whether or not they receive psychotherapy (a phenomenon called *spontaneous recovery*).

(a) If a researcher studies $n = 7$ people who seek psychotherapy, what is the probability that at most 2 of them will exhibit spontaneous recovery.

[YOU MAY USE TABLES A4 FROM THE APPENDIX A OF THE TEXT.]

(b) If the researcher studies $n = 200$ people who seek psychotherapy, what is an approximation to the probability that at most 49 of them will exhibit spontaneous recovery.

4. [20 pts] **Reading Test Scores.** An investigator administers a reading test to a sample of eight students and observes a mean of 83 and sample standard deviation of 17.35.

(a) Calculate 99% confidence interval for the mean reading test score if the scores are normal.

(b) Calculate 99% confidence interval for the observations in (a) if the sample size was 100. What what is different here from (a) and why?

5. [20 pts] **Sea Urchins.** In a laboratory experiment, researchers at Barry University, (Miami Shores, Florida) studied the rate at which sea urchins ingested turtle grass (*Florida Scientist*, Summer/Autumn 1991). The urchins starved for 48 hours, were fed $5cm$ blades of green turtle grass. The mean ingestion time was found to be 2.83 hours and the standard deviation .79 hour. Assume that green turtle grass ingestion time for the sea urchins has an approximately normal distribution.

Find the probability that a sea urchin will require between 2.3 and 4 hours to ingest a 5-cm blade of green turtle grass.

Figure 2: Hi! My name is Sally Sea Urchin.