Assignment 6

Due Wednesday 10/24

Exercises: (P = Problems, TE = Theoretical Exercises)

Chapter 4: P 39*, 40, 44*, 50, 51*, 53, 56, 57, 59*, 63

TE 14, 19*

These problems coincide with those of the same numbers in the fifth edition of our text.

6.A* An average of three births per day occur in a certain suburban hospital. Assume that these births form a Poisson process. Answer the following problems with both an analytic formula (involving exponentials, factorials, powers, etc.) and an explicit numeric (decimal) answer.

(a) What is the probability that no births will occur on October 24, 2001?

(b) What is the probability that exactly one birth occurred between midnight and noon on August 17, 2001?

(c) If it is known that in fact exactly one birth did occur in the time period mentioned in (b), what then is the probability that exactly three births occurred during all of August 17?

(d) The local newspaper reports on births in the hospital from July 1 through ...; the second date is smeared but you consider it equally likely that it is July 2 or July 3. Reading on you find that exactly nine births occurred during this period. With this new information, what probability would you give that the smeared date is July 3?

*Problems marked with an asterisk will be collected and graded. Remember to *explain* how you arrive at your answers.

Hints and instructions:

51, 53. Use the Poisson approximation to the binomial distribution (in 53 you have to explain what you are doing).

56. This does not involve anything new. It is put in just so you can contrast the answer here with the answer (23 people) for the usual birthday problem.

63. Assume that people enter the casino according to a Poisson process.

TE 14. Part (b) is tricky; you should be able to get an expresion for the answer as an infinite sum.

19. Not important at all, just a challenge to your cleverness.