

## Assignment 12

No problems from this assignment will be collected.

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

Chapter 7: TE 50, 51

Chapter 8: P 2, 3, 4, 5, 6, 7, 8, 10, 13

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

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

12 A. (a) A certain random variable  $X$  has moment generating function  $M_X(t) = (1 + e^t + e^{4t})/3$ . Find  $E[X]$  and  $\text{Var}(X)$  from  $M_X(t)$ .

(b) Suppose now that  $X$  is as in (a) and that  $Y$  is a random variable, independent of  $X$ , having exponential distribution with parameter  $\lambda$ . Find the moment generating function  $M_Z(t)$  of the random variable  $Z = X + 2Y$ .

(c) Show that  $X$  takes the values 1, 2, and 3 with equal probability.

**Hints:** Chapter 8: P 2. For (a) use Markov's inequality; for (b) and (c) use Chebyshev's inequality.

6. Notice that the desired event is just the event that the total after 79 rolls is less than 300. Use the central limit theorem.

10, 13 (c,d). Remember that the difference of independent normal random variables is normal (and that you know how to calculate its mean and variance).