STAT 305 - Midterm 1 - Fall 2003

Time: 40 minutes

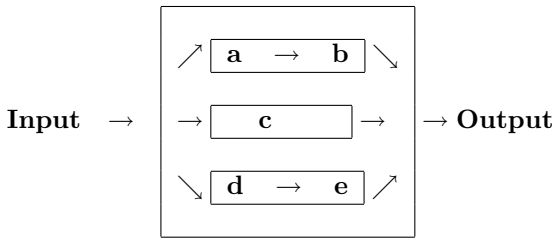
[**25**] Problem 1:

(a) What is the coefficient of x^3y^4 in the expansion of $(x+y)^7$?

(b) What is the coefficient of $x^2y^2z^3$ in the expansion of $(x+y+z)^7$?

[**25**] Problem 2: A line segment of length 1 is cut once at random. What is the probability that the longer piece is more than twice the length of the shorter piece?

[**25**] Problem 3: What is the probability that the system described in the figure below fails if each unit fails with probability p?



[**25**] Problem 4: Suppose that X has the density function

$$f(x) = \begin{cases} cx^2 & 0 \le x \le 1 \\ 0 & \text{otherwise} \end{cases}$$

a) Find c.

b) Find the cumulative distribution function (cdf).

c) What is $P(0.1 \le X < .5)$?