Tutorial 06
March 23-24, 2006

1. The transform and the mean of a random variable X are given by $M_X(s) = ae^s + be^{13(e^s-1)}$ and $E[X] = 5$ respectively. Determine the numerical values of:

   (a) The constants a and b.

   (b) $E[e^{5X}]$.

   (c) $P(X = 1)$.

   (d) $E[X^2]$.

2. Let X, Y, and Z be independent random variables. X is Bernoulli with $p = 1/4$. Y is exponential with parameter 3. Z is Poisson with parameter 5.

   (a) Find the transform of $5Z + 1$.

   (a) Find the transform of $X + Y$.

   (b) Consider the new random variable $U = XY + (1 - X)Z$. Find the transform associated with U.

3. Let X be uniform on $[0, 2]$ and let Y be uniform on $[3, 4]$. Assume that X and Y independent. Find and sketch the PDF of $X + Y$, using convolutions.