February 28 – Distributions of two random variables

1. Experiments with more than one associated random variable. Examples.

2. Two discrete variables:
   
   (a) Example: throw 2 dice and record smaller number $S$ and larger number $L$.
   
   (b) Two discrete variables $X$ and $Y$ have a joint mass function $p(x, y)$.
   
   (c) From the joint mass function can compute individual mass functions, means, etc.
   
   (d) The special case of independence - $p(x, y) = p_X(x)p_Y(y)$.

3. Two continuous variables:
   
   (a) Example: Math SAT score $M$ and Verbal SAT score $V$.
   
   (b) Two continuous variables $X$ and $Y$ have a joint density function $f(x, y)$.
   
   (c) From the joint density function can compute individual density functions, means, etc.
   
   (d) The special case of independence - $f(x, y) = f_X(x)f_Y(y)$.
   
   (e) Another special case, the bivariate normal distribution.

4. Extend all of the above to more variables and to the mixture of discrete and continuous variables.

Homework, Due Friday, March 4

1. Read Devore and Farnum pages 218–220 and pages 146–149.

2. Do problem 3.41.

3. Suppose that $X$ and $Y$ are continuous random variables with $f(x, y) = 2, 0 \leq x \leq y \leq 1$. Find $P(1/2 \leq X)$. (Hint: Draw a picture.)