Mathematics 170A – HW4 – Due Tuesday, February 7, 2012.

Problems 55,59 on pages 68-69 and 2,4,6 on pages 119-120.

F_1. Let n be a positive integer, and let $p(k) = c2^k$ for $k = 1, 2, ..., n$, and $p(k) = 0$ otherwise. Find the value of c that makes p into a PMF.

F_2. Suppose X is a random variable with the following PMF:

k	-3	-1	0	1	2	3	5	8
$p(k)$	.1	.2	.15	.2	.1	.15	.05	.05

Compute the probabilities of the following events:
(a) $X > 3$;
(b) $4 \leq X \leq 7$ or $X > 9$;
(c) $3 \leq X \leq 5$ or $7 \leq X \leq 10$.

F_3. Two balls are chosen at random from a box containing 12 balls, numbered $1, 2, ..., 12$. Let X be the larger of the two numbers obtained. Compute the PMF of X, if the sampling is done
(a) with replacement;
(b) without replacement.

F_4. Suppose X has the geometric distribution with parameter p, and n is a positive integer. Let $Y = \min(X, n)$ and $Z = X^2$.
(a) Find the PMF of Y.
(b) Find the PMF of Z.

F_5. (a) Give a combinatorial explanation of the identity

$$\binom{n+m}{k} = \sum_{i=0}^{k} \binom{n}{i}\binom{m}{k-i}.$$

(b) What does this identity say about the hypergeometric PMF?