Name: _____

R. D. Foley
February 14, 2008

ISyE 2027
Test 1

Calculators, notes, and books are not allowed. Please show your work in your bluebook and transfer your answers to the back of this sheet. Put your name on back and front of this sheet. Please stop working when time is up. You may leave terms like $\binom{52}{5}$ and e^{-2} in your answers.

1. (30 points) Consider cars driving along a single lane road approaching an intersection. What would be a reasonable guess for the name of the distribution of the following: (a) the number of cars out of the next 12 that turn at the intersection, (b) the number of cars until one of the cars turns left, and (c) whether or not exactly 3 of the next 12 cars turn right.

2. (30 points) Suppose $\Pr(A) = 5/15$, $\Pr(B) = 3/15$, and $\Pr(A \cap B) = 2/15$. Compute (a) $\Pr(A \cup B)$, (b) $\Pr(B \mid A)$, and (c) $\Pr(B \mid \bar{A})$.

3. (30 points) Suppose Praachi is dealt 4 cards from a standard deck. (a) What is the probability that Praachi has 2 pairs? (b) What is the probability that Praachi has 3 of a kind? (c) What is the probability that Praachi has a flush?

4. (30 points) Compute the following: (a) $\sum_{k=1}^{\infty}(1/7)^k$, (b) $\sum_{k=1}^{\infty}(1/7)^k/(k-1)!$, and (c) $\sum_{k=0}^{100}\binom{100}{k}(1/7)^k$.

5. (30 points) In 1973, roughly 30% of the women applying to graduate school at Berkeley were accepted, but 40% of the men applying were accepted. Two-thirds of the applicants were male. (a) What is the overall probability of being accepted to graduate school at Berkeley? (Or, what fraction of the applicants are accepted?) (b) Given an applicant is accepted, what is the probability that the applicant is a woman? (Or, what fraction of the accepted students were female?) (c) Given that an applicant was not accepted, what is the probability that the applicant is a woman?

6. (30 points) Let X have probability mass function $\Pr\{X = k\} = c(k+1)^2$ for $k = 0, 1, 2$ and zero, otherwise. Compute (a) $\Pr\{X = 1\}$, (b)$\Pr\{X > 0\}$, and (c) $\Pr\{X > 0 \mid X = 1\}$.

7. (30 points) Suppose the events A and B are independent, disjoint, and $\Pr(B) = 4/10$. Compute (a) $\Pr(A \mid B)$, (b) $\Pr(A)$, and $\Pr(\overline{A \cup B})$.