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Instructions: No calculators, notes or books. Show your work in the bluebook
and place your answer on the answer sheet on the back of this test.

ISyE 2027—Test 1
September 29, 2004

[30]   1. Suppose $P(A) = .7$, $P(B) = .4$, and $P(A \cap B) = .1$. Compute (a) $P(A')$,
            (b) $P(A \mid B)$, (c) $P(A \cup B)$, (d) $P(A' \cap B')$, and (e) $P(A' \mid B)$.

[30]   2. Suppose $S = \{s_0, s_1, \ldots\}$ and $A_k = \{s_k\}$. (a) If $\Pr(A_k) = (1/5)^k$ for
            $k = 1, 2, \ldots$, what is $\Pr(A_0)$? (b) If $\Pr(A_k) = e^{-1/5}(1/5)^k/k!$ for
            $k = 1, 2, \ldots$, what is $\Pr(A_0)$?

          3. Suppose I am dealt 7 cards from a standard 52 card deck. (a) What is
[30]   the probability of a hand containing 3 of one kind and 2 pairs? (b) What
             is the probability of a hand containing four aces and 3 kings? Please
             leave your answer in terms of factorials or $\binom{n}{k}$.

          4. A box contains 4 red and 6 white balls. A sample of size 3 is drawn
[30]   without replacement. What is the probability of obtaining 1 red and 2
             white given that at least 2 of the balls in the sample are white. Please
             work this out completely; i.e., do not leave your answer in terms of
             factorials or $\binom{n}{k}$

          5. Any one of 3 three judges may be assigned to hear a particular case. The
             plaintiff's lawyer believes the chance of winning the case under Judge A
[30]   is 80%, under Judge B it would be 70%, and under Judge C only 30%.
             (a) Assuming that the judges are assigned to cases randomly, what
             would be the probability of winning the case? (b) If the case were won,
             what would be the probability that Judge A had presided over the case?

          6. A policeman with a radar gun is measuring the speed of vehicles heading
             north on Ga. 400 at Old Milton Parkway. What would be a reasonable
[30]   guess for the name of the distribution of each of the following? (a) How
             many vehicles are measured until one is measured at a speed below the
             speed limit? (b) How many vehicles out of the next 30 are travelling
             within the speed limit? (c) Whether or not the policeman pulls over the
             next speeding vehicle?

1. (a) _____

   (b) _____

   (c) _____

2. (a) _____

   (b) _____

   (c) _____

3. (a) _____

   (b) _____

   (c) _____

   (d) _____

   (e) _____

4. (a) _____

   (b) _____

5. (a) _____

   (b) _____