Name: _____

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ISyE 2027 B

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 everything and hand in both the bluebook, test, and answer sheet. Please stop working when I tell you that the time is up. Please do not divulge information about this test to people who are not members of this class until 4:30 p.m.

1. (30 points) Suppose $\Pr(A) = .3$, $\Pr(B) = .4$, and $\Pr(A \cup B) = .6$. Compute (a) $\Pr(\bar{B})$, where $\bar{B}$ denotes the complement of B, (b) $\Pr(A \cap B)$, (c) $\Pr(B \mid A)$, (d) $\Pr(\bar{B} \mid A)$, and (e) Are A and B independent?

2. (30 points) Leave your answer to in terms of $\binom{n}{k}$. Suppose we are dealt 4 cards from a well-shuffled standard poker deck. (a) What is the probability of 3 of a kind? (b) What is the probability of two pairs? (c) What is the probability mass function of the number of red kings in the hand?

3. (30 points) What would be a reasonable guess as to the distribution of each of the following? (a) the number of hawks among the next 25 birds seen, (b) the number of birds seen until a hawk is seen, (c) the number of hawks seen today.

4. (30 points) Let X be a discrete random variable with probability mass function $\Pr\{X = k\} = c(2 + k)$ for $k = 2, 3, 4$. (a) Determine c. (b) Compute $\Pr\{X = 2 \mid X \leq 3\}$. (c) Compute the mean of X.

5. (30 points) A particular component is used in assembling products. We obtain 60% of these components from Supplier A and the rest from Supplier B. One percent of the components from Supplier A are defective, while two percent of Supplier B's are defective. (a) What is the probability that a randomly selected component is defective? (b) Given that a randomly selected component is defective, what is the probability that it came from Supplier A? (c) Would it be better, worse, or no difference to have 70% of the items from Supplier A?

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