Name: _____

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ISyE 2027 C

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.

1. (30 points) Suppose $\Pr(A) = .4$, $\Pr(B) = .3$, and $\Pr(A \mid B) = 2/3$. Compute (a) $\Pr(\bar{B})$, where $\bar{B}$ denotes the complement of B, (b) $\Pr(A \cap B)$, (c) $\Pr(B \cup A)$, (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 5 cards from a deck where all of the two, threes, ..., and nines from the deck have been removed (leaving only 20 cards in the deck before the hands are dealt). (a) What is the probability two pairs? (b) What is the probability of a full house? (c) What is the probability mass function of the number of 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 customers who enter the grocery store in the next hour, (b) out of the next 30 customers, the number of customers who purchase bread, (c) the number of customers who pay for their items until a customer uses a credit card.

4. (30 points) Let X be a discrete random variable with probability mass function $\Pr\{X = k\} = c(6 - k)$ for $k = 2, 3, 4$. (a) Determine c. (b) Compute $\Pr\{X = 2 \mid X \le 3\}$. (c) Compute the mean of X.

5. (30 points) A particular component is used in assembling products. We obtain 70% 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 60% of the items coming from Supplier A?