

Name: _____

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ISyE 2027
Test 1

Calculators, notes, and books are not allowed. Please show your work in the 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.

- (30 points) Suppose $P(A) = .3$, $P(B) = .4$, and $P(A \cup B) = .9$. Compute (a) $P(B')$, (b) $P(A \cap B)$, (c) $P(A | B)$, (d) $P(A' | B)$, and (e) $P(B | A')$.
- (30 points) Suppose the sample space $S = \{1, 2, 3\}$, $A_k = \{k\}$, and $\Pr(A_k) = c(4 - k)$ for $k = 1, 2, 3$. (a) Determine c . (b) Compute $\Pr(A_2 | A_2)$. (c) Compute $\Pr(A_1 | A_2')$.
- (30 points) Suppose the sample space $S = \{0, 1, 2, \dots\}$, $A_k = \{k\}$, and $\Pr(A_k) = c(9)^k/k!$ for $k = 0, 1, 2, \dots$. (a) Determine c . (b) Compute $\Pr(A_0')$. (c) Compute $\Pr(A_0 | A_0 \cup A_1)$.
- (30 points) Leave your answer to in terms of $\binom{n}{k}$. Suppose we are dealt 9 cards from a standard poker deck. (a) What is the probability of 3 triples? (b) What is the probability of a flush (all 9 cards in the same suit)? (c) What is the probability of getting 4 of one kind, 3 of another, and a pair?
- (30 points) A particular component is used in assembling products. We obtain two thirds 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) Let A be the event that a randomly selected component came from Supplier A and D be the event that a randomly is defective. Are A and D independent? Explain.
- (30 points = 5 points for the series plus 25 points for summing the series) In Problem 3, what is the probability of the event $B = \{0, 2, 4, \dots\}$ (a) as a series? (b) in a closed form expression?