

Instructions:

- Write all work in the exam booklet.
 - Show all work that leads to your answer. If no detailed work then no credit.
 - In each case show the expression that could be evaluated to get a numerical answer. You do not need to find the numerical answer. Put a box around your answer.
 - Print Your Name, Your TAs name and your Discussion Time in the exam booklet. Do not write in the upper right corner of the exam booklet. This is reserved to write your scores.
1. $P(A) = 1/3$ and $P(B) = 1/3$. (a) Find $P = P(A \cup B)$ given that A, B are independent then (b) repeat assuming A, B are mutually exclusive.
 2. $P(A^c) = .7$, $P(B) = .2$ and $P(A \cap B^c) = .2$. Find $P(A \cup B | A \cup B^c)$
 3. There are two varieties of unfair coins: A and B. A gives heads with probability 40% and B gives heads with probability 20%. There are 6 coins of type A and 3 coins of type B. One is randomly chosen and tossed. What is the probability that a coin of type A had been chosen, given the fact that the outcome was tails.
 4. A box has 70 red balls, 20 Green balls and 10 Blue balls. Six balls are picked at random one at a time. Use the product rule for n-tuples to find the probability of getting (R,G,R,B,G,R). Order matters.
 5. A box has Purple balls, Yellow balls and Maroon balls. Nine balls are picked at random one at a time. Given that the probability of the 9-tuple (Y,Y,P,P,P,P,M,M,M) is .0002, find the probability of getting 4 P's, 3 M's and 2 Y's in any order.
 6. In how many ways can 3 married couples sit in a row if no 2 men sit next to each other?
 7. How many permutations of the letters BCCDDDAEIOU are there if the vowels must be in alphabetical order?
 8. An order of award presentations has been devised for seven people: Jeff, Karen, Lyle, Maria, Norm, Olivia, and Paul. In how many ways can the awards be presented if the third award is presented to Karen or Norm and the last award is to be presented to Lyle or Maria?
 9. If all of the Spades have been removed from a deck of 52 cards, what is the probability that you can be dealt a five card poker hand that has two cards of one denomination, two of a second denomination, and one card of a third denomination?
 10. Given: $n(U) = 100$, $n(A) = 20$, $n(B) = 15$, $n(C) = 20$, $n(A \cap B) = 7$, $n(A \cap C) = 6$, $n(B \cap C) = 7$, $n(A \cap B \cap C) = 2$. Find $n(A \cap B' \cap C')$ and show your work.