

**MATH M118: Finite Mathematics**  
**Practice Department Final Examination: Part A (Chapters 2, 3, and 4)**

1. Let  $U = \{1, 2, 3, \dots, 10, 11, 12\}$ . Let  $X$ ,  $Y$  and  $Z$  be subsets of  $U$  such that  
 $X = \{2, 4, 6, 8, 10\}$      $Y = \{4, 5, 6, 7, 8\}$      $Z = \{5, 6, 9, 10\}$ 
  - (a) Find  $(X - Y) \cup Z$
  - (b) Find  $X' \cap Z$
  
2. Determine if each of the following statements is true (always true) or false (not always true):
  - (a)  $B \cup B' = U$
  - (b)  $U - A = A'$
  - (c)  $(G \cup H)' = G' \cup H'$
  - (d)  $E - F = E \cap F'$
  
3. Let  $A$  and  $B$  be subsets of  $U$ . Find all the elements of  $B$  if:  
 $U = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$   
 $A = \{1, 3, 5, 6, 8\}$   
 $A \cap B = \{3, 5\}$   
 $A \cup B = \{1, 3, 4, 5, 6, 8, 9\}$
  
4. Of the 200 students who participated in a survey, 105 like pizza, 75 like tacos and 42 like both. How many like neither?
  
5. Let  $A$  and  $B$  be subsets of a universal set  $U$ ,  $n(U) = 56$ ,  $n(A' \cap B') = 8$ ,  $n(B - A) = 10$ , and  $n(A - B) = 15$ . Find  $n(A \cap B)$ .
  
6. 200 people are surveyed at a movie theatre about the types of movies they like:  
88 like Comedies; 42 like Science Fiction; 51 like Drama; 20 like Comedy and Science Fiction; 8 like Drama and Science Fiction; 15 like Comedy and Drama; 6 like all three.
  - (a) How many like exactly one of these types of movies?
  - (b) How many like exactly two of these types of movies?
  - (c) How many like none of these types of movies?
  
7. A group consists of 10 men and 11 women. In how many ways can a team of exactly 4 men and 6 women be selected?

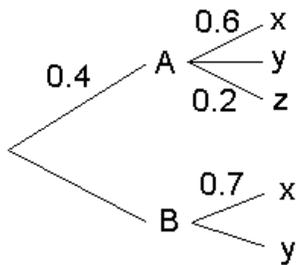
8. A car show has 22 cars competing for "Best in Show." Prizes are awarded for first, second and third place; any one car may only win one prize. In how many ways can the prizes be awarded?
9. How many different committees of 3 can be formed from 15 Republicans and 12 Democrats if at least one Republican and at least one Democrat must be on the committee? Choose the correct set up from the following options:
- A.  $P(15,3) \cdot P(12,3)$                       B.  $C(15,3) \cdot C(12,3)$
- C.  $P(15,1) \cdot P(12,2) + P(15,2) \cdot P(12,1)$       D.  $C(15,1) \cdot C(12,2) + C(15,2) \cdot C(12,1)$
- E.  $1 - P(15,3) \cdot P(12,3)$                       F.  $1 - C(15,3) \cdot C(12,3)$
10. How many three-digit even numbers can be formed using digits from the set  $\{1, 2, 3, 4, 5, 6, 7\}$
- (a) If no digit can be repeated in any one number?  
 (b) If digits can be repeated?
11. An urn contains 5 purple, 6 orange, and 3 black marbles. In how many ways can 3 marbles be selected, without replacement, so that at least one of the three is black?
12. How many distinguishable arrangements can be formed using all of the letters in the word BASEBALLS?
13. A group of students consists of 6 Freshmen and 3 Juniors. Three students are selected at random.
- (a) Find the probability that all 3 are Freshmen.  
 (b) Find the probability that all 3 are Freshmen given that they're all in the same grade level.
14. At Dee Dee's Dinette the probability that a customer orders coffee is 0.60, the probability that a customer orders pie is 0.35, and the probability that a customer orders neither coffee nor pie is 0.30. Find the probability that a customer orders both coffee and pie.
15. Let A and B be events such that:  $\Pr[A] = 0.6$ ,  $\Pr[A \cup B] = 0.9$ , and  $\Pr[B|A]=0.4$ . Find  $\Pr[B]$ .
16. A student guesses on all 8 questions of a multiple-choice quiz, where there are 4 answer choices for each question. Find the probability that he will get exactly 3 questions correct.
17. For the same student and quiz as in #16 above, find the probability that he will get at least one question correct.

18. Five cards are selected at random from a fair deck. What is the probability that exactly 3 red cards are selected?

19. Given the tree diagram below, find:

(a)  $\Pr[y | B]$

(b)  $\Pr[B | y]$



20. A given school's population is 40% women and 60% men. Of the school's women, 30% are involved in music. Of the school's men, 80% are involved in music. One student is randomly selected. Given that the selected student is involved in music, find the probability that the student is a woman.