

**Math 124 Review. (This is a good start, but not a complete review.)**

- (1) (a) Draw a Venn Diagram for the set  $(A' \cap B) \cup C$ .
- (b) State the Inclusion/Exclusion formula for 2 sets.
- (2) (a) How many distinct words can be spelled using all the letters in COLORADO?
- (b) How many 4-letter words can be spelled using the letters in COLORADO?
- (3) (a) A pair of fair dice are rolled. Find the probability of not getting a sum of 4.
- (b) A coin is flipped 3 times. Find the probability of obtaining all heads or all tails.
- (4) A die is rolled and we are paid \$3 if a 1 or a 6 is rolled and we pay \$1 if any other number is rolled. What are the expected winnings?
- (5) A pair of fair dice are rolled. Find the probability that the sum is 8 **given** that atleast 1 die is a 3.
- (6) A Bernoulli trial with probability of success  $p = .4$  is performed 8 times. Using Bernoulli's formula, find the probability of getting
- (a) exactly 2 successes
- (b) atmost 2 successes
- (c) atleast 2 successes

~~(7) Use the inverse of the matrix~~

$$\begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix}$$

~~to solve the system~~

$$5x_1 + 3x_2 = 4$$

$$3x_1 + 2x_2 = -2$$

(8) Find the value of  $k$  for which the system of equations is consistent.

$$x_1 + 3x_2 + 5x_3 = 2$$

$$-3x_1 - 8x_2 - 13x_3 = -5$$

$$-x_1 - 2x_2 - 3x_3 = k$$

(9) (a) Use corner points to solve the following linear program:

Minimize

$$z = -2x + 3y$$

subject to

$$-x + y \leq 1$$

$$x + 2y \geq 4$$

$$4x + 5y \leq 20$$

(b) Use the same feasibility region and maximize the objective function  $z = 5x - 2y$ .

- (10) There are 10 apples and 7 oranges in a bowl. In how many ways can one select 6 apples and 3 oranges?
- (11) In how many ways can a cast of 6 different roles be selected from 15 actors?
- (12) Solve the system and then parametrically represent the solution

$$2x + 8y + 10z - 6w = 12$$

$$3x + 12y + 19z - 17w = 22$$

$$-2x - 8y - 8z + 5w = -16$$

- (13) Cayuga College buys 70% of its copier paper from Westfall supplies and 30% from Northwoods Paper Company. It is known that paper from Westfall will jam with probability .0032 and paper from Northwoods will jam with probability .0061. If a random piece of paper jams, what is the probability that it came from Westfall? Include a probability tree.
- (14) A hat contains 7 different numbers on separate slips of paper, and an ordered sample of 3 slips is drawn. Find the number of samples if the drawing is done  
(a) with replacement and (b) without replacement.
- (15) A die is thrown 4 times. Find the probability that exactly 3 fives will occur.
- (16) Find  $\begin{bmatrix} 2 & 1 & -6 & 3 \\ -5 & 0 & -9 & 8 \end{bmatrix} + 4 \begin{bmatrix} -1 & -3 & 2 & -2 \\ 1 & 3 & 4 & -5 \end{bmatrix}$
- (17) A ball is drawn from an urn containing 8 balls numbered 1-8. Let X be 2 if the number is odd, and one-half of the number if it is even. Find the probability distribution **and** the expected value.
- (18) Use Gaussian elimination to solve the following systems simultaneously:

$$x + 2y - 3z = -1$$

$$3x + 5y + 3z = 2$$

$$-5x - 9y + 8z = 5$$

and

$$x + 2y - 3z = 2$$

$$3x + 5y + 3z = -3$$

$$-5x - 9y + 8z = -16$$

- ~~(19) The Kaanian economy has the goods plastic and oil. Let \$1 in plastic require \$.20 in oil, while each \$1 in oil uses \$3 in plastic and \$.30 in oil. Suppose that there is an outside demand for \$18 million in plastic and \$15 million in oil. Find the consumption matrix  $C$ , and then compute  $I - C$ , the inverse  $(I - C)^{-1}$ , and the production vector for the given external demand. What dollar amount must each industry produce in a given time period?~~

- (20)  $U = \{x, y, s, t, 1, 2\}$ ,  $A = \{x, y, t\}$ ,  $B = \{s, t, 1, 2\}$ . Find:  
 (a)  $A \cup B$   
 (b)  $A \cap B'$
- (21) Out of sample of 960 television viewers, 450 watched basketball, 515 watched football, and 215 watched both.  
 (a) How many watched football but not basketball?  
 (b) How many watched basketball but not football?  
 Assume a viewer is randomly chosen from the sample  
 (a)' What is the probability that he watched football but not basketball?  
 (b)' What is the probability that he watched basketball but not football?
- (22) A die is weighted in such a way that  
 $Pr(1) = \frac{1}{3}$ .  $Pr(2) = Pr(3) = Pr(4) = Pr(5)$ , and  $Pr(6) = \frac{1}{9}$ .  
 Let E be the event of rolling a 2, 4, or 6. Find  $Pr(E)$ .
- (23) A pair of dice is rolled.  
 E: The second die is odd  
 G: The sum is 4  
 (a) Determine if E and G are independent.  
 (b) Find the conditional probability  $Pr(E|G)$ .
- (24) Let a line have the equation  $4x - 3y = 5$ . Find the equation of a parallel line that passes through the point  $(5, -1)$ . Find the equation of a perpendicular line that passes through  $(6, 2)$ .
- (25) American Sporting Goods constructs softballs and hardballs from leather and yarn. A softball requires 100 in.<sup>2</sup> of leather and 20 oz of yarn, while a hardball uses 30 in.<sup>2</sup> of leather and 8 oz of yarn. There are 3000 in.<sup>2</sup> of leather and 720 oz of yarn available. Find the linear mathematical model that describes the feasible combinations. Graph the feasibility region and find the corner points.
- (26)  $A = \begin{bmatrix} 5 & -1 & 6 \\ -4 & 3 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} -2 & 3 & -5 \\ -3 & 4 & 1 \end{bmatrix}$ ,  $C = \begin{bmatrix} 1 & 6 \\ 5 & 2 \\ -1 & 3 \end{bmatrix}$ ,  
 Find (a)  $AC$ ,  $BC$ .