Review For Final Exam

MATH 141 Spring '03

1. Three balls are drawn without replacement from a bag that has five yellow, three red, and four purple balls. What is the probability that the third ball is red?

2. Find the distance between $(3, -2)$ and $(6, -2)$.

3. You are extremely bored and decide to play "Black Jack". You deal yourself two cards. One of the cards is an ace (worth 11 or 1 your choice). What is the probability that the total value of your cards is 21? (Remember the face cards are worth 10 and the other cards are worth face value.)

4. A line goes through the points $(1, 2)$ and $(8, 5)$.
a. Find a line parallel through the point $(2, -1)$.
b. Find a line perpendicular through the point $(-3, 6)$.

5. Solve the following system of equations:
$6x - 3y + z = 11$
$x + 5y + 6z = 21$
$2x + y - 2z = -3$

6. There are twelve Zodiac signs (Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricorn, Aquarius, and Pisces). Each sign corresponds to a different calendar period about a month long. If you assume that a person is equally likely to be born under each sign, what is the probability that in a group of five people at least two of them
a. Have the same sign?
b. Were born under the sign of Aries?

7. Solve the following system of equations:
$x - y + 2z = 7$
$3x - 4y = 2$
$-x + 3y - 2z = 3$

8. If $P(M) = .54$ and $P(E) = .36$ and $P(M \bigcap E) = .1$, are the events M and E
a. independent?
b. mutually exclusive?

9. What is the probability of winning the Texas lottery which contains the numbers 1 through 54? You pick six numbers and order does not matter.

10. Five cards are drawn from a standard 52 card deck. Find the probability of getting a royal flush. (A royal flush is where you have a 10, J, Q, K, A all from the same suit).

11. Solve for x, y, z, and t if $\begin{bmatrix} 5z & 10 \\ 12 & 2t-1 \end{bmatrix} - 2\begin{bmatrix} 0 & y \\ -3x & -1 \end{bmatrix} = \begin{bmatrix} 25 & 17 \\ 21 & 15 \end{bmatrix}^{-1}$

12. Classify the following type of random variable as finite discrete, infinite discrete, or continuous: X =the distance an average soccer player runs during the game.

13. You pick a dog to win a race. His odds are 1 to 50. What is the probability of him winning the race?

14. Two cards are selected from a standard deck and suits are recorded.
a. Find the sample space.
b. Describe the event "at least one card is a spade".

15. If matrix $A = \begin{bmatrix} -3 & 4 & 7 & 10 \\ 4 & 0 & -1 & -20 \\ 8 & 9 & 3 & 2 \\ 2 & 6 & -5 & 5 \end{bmatrix}$ and matrix $B = \begin{bmatrix} 2 & 6 & -10 & 4 \end{bmatrix}$
a. Find AB.
b. Find BA.
c. Find $A - B$.
d. Find $B - A$.
e. Find B^T

16. What is the probability of at least two clubs if you draw five cards from a standard deck with replacement?

17. Your pocket contains five quarters, 10 pennies, and four nickels. If you reach in and grab two coins at random, what is the probability that
a. the first coin is a nickel?
b. the second coin is a quarter?
c. the second coin is a penny given the first coin is a nickel?
d. the first coin is a quarter given the second coin was a nickel?

18. Find the line that contains the points $(4, 8)$ and $(10, 2)$.

19. Nancy selects a security from a list of three growth stocks, seven income stocks, and five bonds. What is the probability that she selects a bond or a growth stock?

20. Tim has six brown, four tan, and ten black socks. What is the probability of Tim grabbing a matching pair?

21. Solve the following system of equations:
$2x + 4y + 6z = 22$
$3x + 8y + 5z = 27$
$-x + y + 2z = 2$

22. Two hundred college girls were asked "which TV show they watched the most the Bachelorette or Joe Millionaire". 120 said Bachelorette and the rest said Joe Millionaire. Recently the same girls were asked is the are now watching the new bachelor. Of the girls who watched Bachelorette, 80% are while only 50% are who watched Joe Millionaire.
a. What is the probability of a girl watching the Bachelor?
b. What is the probability of a girl watching Joe Millionaire knowing she watches the Bachelor?
c. What is the probability of a girl watching the Bachelorette and the Bachelor?

23. A not so diligent young student is studying for a probability test from a thirty question practice exam. He knows how to do 15 of them. If the test has nine questions, what is the probability he knows how to do 7 or more of the questions?

24. Find the line through the point $(5, -2)$ parallel to $y = -\frac{1}{3}x + 5$.

25. Find the line through the point $(6, 1)$ perpendicular to $y = \frac{2}{3}x + \frac{12}{5}$.

26. A locker contains eight soccer balls, five footballs, and seven basketballs. Four balls are picked at random from the locker.
a. What is the probability of all soccer balls?
b. What is the probability of three footballs and one soccer ball being selected?
c. What is the probability of at least one basketball?

27. Find the distance between the points $(-8, -6)$ and $(7, 10)$.

28. A bag contains 12 blue, 10 purple, 8 orange, and five pink frisbees. Five are drawn with replacement. What is the probability that
a. the second frisbee is pink?
b. a purple one is drawn?
c. an orange frisbee is drawn first given the second one was orange?

29. How many four digit numbers can be formed if zero cannot be the first digit, no digit can be repeated, and each number must be even?

30. How many four digit numbers can have at least one seven? Assume the first digit is not zero.

31. The annual interest on Sid Carrington's three investments amounts to $\$21,600$. He makes 6% on a savings account, 8% on mutual funds, and 12% on bonds. The amount of investment in bonds was twice the amount in the savings account. The interest earned from the bonds was equal to the dividends he received from the mutual funds. How much money did he place in each type of investment?

32. How many distinct ways can the letters in the word KITTEN be arranged?

33. The following data is an estimation of the cost output relationship for a surfboard manufacturer where the output is in thousands and the total cost is in thousands.

Output	15	32	48	55	60	102	110
Cost	30	49	99	106	133	225	250

a. Find the best fit line.
b. Predict the output if total cost is $\$113,000$.
c. What is the total cost if the output is $11,000$ surfboards?

34. A dance company needs ro rent a theater to put on a show. The theater charges a fixed cost of \$950 and an additional cost of \$1.75 per ticket sold. Tickets for the show cost \$7.50 each.
a. Find the cost equation.
b. Find the revenue equation.
c. Find the profit equation.

35. Given the triangle with vertices $(-5,3)$, $(4,-4)$, and $(8,4)$ answer the following questions:
a. Which one of these line segments is the shortest?
b. Which one of these line segments is the longest?
c. Which one of these vertices is closest to the point $(1,2)$?

36. Maximize $P = 50x + 80y$
Subject to: $x + 2y \leq 32$
$3x + 4y \leq 84$
$x, y \geq 0$

37. Find the center and radius if $(x+3)^2 + (y-2)^2 = 25$.

38. In how many ways can a license plate consist of two letters and four digits in any order with no digits being repeated?

39. Find a line perpendicular to $y = -\frac{1}{4}x + 3$ through the point $(-1,-4)$.

40. A board game costs \$20 in the store. There is a fixed cost of $\$10,000$ and it costs the manufacturer \$10 to make each game.
a. Find the cost equation.
b. Find the revenue equation.
c. Find the profit equation.
d. How much profit can be made if 1500 games are sold?

41. How many ways can three politicians be elected President, Vice President, and Secretary?

42. Shade the following:
a. $A \bigcup B \bigcup C$
b. $(A \bigcap B) \bigcup C$
c. $(B \bigcap C^c) \bigcup A^c$

43. A new car costs $\$35,000$. Five years later it can be sold for $\$12,500$. Using linear depreciation find how much the car is worth four years after it was bought.

44. 100 people were asked which is your favorite TV show Friends, the Practice, or Survivor?
30 people watched none of these
15 watched only Friends
7 watched all three
17 watched Survivor
10 watched Survivor and the Practice
30 watched Friends
12 watched Friends and the Practice.
What is the most commonly watched TV show?

45. How many ways can you make a password containing two letters and four digits in any order with no digits or letters repeating?

46. It costs a jeweler \$25 to make a necklace. There is a fixed cost of \$4,000. He sells the necklace for \$35.
a. Find the cost equation.
b. Find the revenue equation.
c. Find the profit equation.
d. Find the break even point.

47. The columns of matrix A are gender (male, female) and the rows are age groups (5-17, 18- 29, and 30+) $A = \begin{bmatrix} 15 & 20 \\ 155 & 160 \\ 25 & 25 \end{bmatrix}$. The rows of matrix B are gender (male, female) and the columns are the percentages of people seeing movie A, B, C, and D. $B = \begin{bmatrix} .3 & .15 & .75 & .5 \\ .7 & .85 & .25 & .5 \end{bmatrix}$. Find matrix AB and explain what each entry means.

48. Solve the following system of equations:
$3x - 12y - 3z = 5$
$2x = -4$
$10x + 13z = 0$

49. The following data represents the average population of College Station from 1985-1999.

Year	1985	1987	1989	1990	1995	1999
Population	110,000	115,000	117,200	118,700	125,000	140,000

a. Find the best fit line.
b. What was the population in 1981?
c. What year is the population 150,000?

50. A new motorcycle costs \$29,000. In ten years, the motorcycle can be sold for \$5,000. Using straight-line depreciation, what is the motorcycle worth 2 years after it was bought?

51. A math class took a test which 75% of the students studied for. Of the students who studied, 50% made an A or a B. Out of the students who did not study, 10% made an A or a B. What is the probability that a student who did not make an A or a B studied?

52. Mike is riding in a 10K Bike Marathon. His life long enemy Billy Bob is out to get him. Mike is very close to winning the grand prize of \$40,000 and an Xbox. Billy Bob wants to destroy Mike's chances of winning by running into him. Using a map and his left thumb, he casually notices that Mike is 2 cm above the origin on the map with a slope of $\frac{2}{3}$. If Billy Bob is standing 4 cm to the left and 1 cm under the origin, in what direction (line) must Billy Bob run in order to smash into Mike?

53. A basket contains two footballs, four soccer balls, five basketballs, and three volley balls. If three items are picked at random, what is the probability all will be soccer balls?

54. A farmer has 23,000 hours available to work and 500 acres of land. The farmer divides his land for corn and wheat. If it takes 30 hours to care for each acre of wheat and 50 for each acre of corn, how much of each should he plant?

55. A child has a lot of lego's. He has 2500 square bricks, 1450 rectangular bricks, and 800 really long bricks. He wishes to build a village. The village contains three types of buildings: homes, shops, and restaurants. Each house requires 100 square, 100 rectangular, and 41 really long bricks. Each shop requires 150 square, 50 rectangular, and 45 long bricks. Each restaurant requires 200 square, 50 rectangular, and 40 long bricks. Determine how many of each type of building the child can build.

56. If A and B are mutually exclusive events and $P(A) = .4$ and $P(B) = .3$, find the following:
a. $P(A \bigcup B)$
b. $P(B^c)$
c. $P(A \bigcap B)$
d. $P(A \bigcap B^c)$

57. There are five towns: A, B, C, D, and E. Town A is located at $(1, 7)$, town B is $(-6, 3)$, town C is $(4, 4)$, town D is $(-2, -5)$, and town E is $(5, -4)$. To get from town A to town E you have two choices (1) travel from A to E through town C or (2) travel from A to E through B and then through D. Find which route has the shortest distance.

58. The following data represents the average value of a company from 1983 to 20003.

$year$	1983	1985	1989	1994	1998	2001	2003
$value$	$68,000$	$77,000$	$90,000$	$140,000$	$200,000$	$245,000$	$300,000$

a. Find the line that best fits the data.
b. Predict the average value of the company in 2006.
c. What year is the average value $\$185,000$?

59. The following table gives the number of shares of certain corporations held by Leslie and Tom in their respective IRA accounts at the beginning of the year.

	IBM	GE	$FORD$	$WAL-MART$
$Leslie$	500	350	200	400
Tom	400	450	300	200

Over the year they added more shares to their accounts as shown in the following table:

	IBM	GE	$FORD$	$WAL-MART$
$Leslie$	50	50	0	100
Tom	0	80	100	50

a. Write a matrix A giving the holdings for Leslie and Tom at the beginning of the year and matrix B giving the shares they have added to their portfolios.
b. Find matrix C giving their total holdings at the end of the year.

60. Find the distance between the points $(4, 6)$ and $(-2, 9)$.

61. Robert makes student failure devices. His fixed cost are $1000. He also has a cost of $5 per item. If he sells 100 devices, his profits are $\$10,000$. Find the selling price.

62. In how many ways can eight students running for class offices be listed on the ballot?

63. How many different license plates can be made if both numbers and letters can be used and
a. there has to be three numbers and three letters.
b. the first space has to be a number and no repeats.
c. no letters or numbers can be repeated and the first three have to be letters and the last three have to be numbers.

64. A bag contains four white and two black chips. Another bag contains three white and seven black chips. If one chip is drawn from each bag, in how many samples are the chips different colors?

65. In how many ways can three bus drivers be chosen from a group of eleven candidates?

66. A toy company has plants in Chicago and Memphis where they make three different kinds of stuffed animals out of stuffing, plush, and trim. The number of each kind of animal made in each city is shown in matrix A. The number of units of each kind of material needed for each animal is shown in matrix B. What is the meaning of the entries in the product matrix AB?

$$A = \left[\begin{array}{c|ccc} & bears & dogs & rabbits \\ \hline Chicago & 60 & 76 & 12 \\ Memphis & 15 & 12 & 49 \end{array}\right] \qquad B = \left[\begin{array}{c|ccc} & stuffing & plush & trim \\ \hline bears & 8 & 9 & 3 \\ dogs & 10 & 12 & 8 \\ rabbits & 5 & 6 & 5 \end{array}\right]$$

67. Toss a coin three times.
a. Find the sample space.
b. Find the values of the random variable is the number of heads is recorded.
c. Is this random variable infinite discrete, finite discrete, or continuous?

68. A box contains 25 tape recorders of which five are defective. If seven are selected at random, find the probability that
a. exactly two are defective.
b. at least five are not defective.
c. the first two are defective, the third is not, the fourth and fifth are defective, and the sixth and seventh are not.

69. Courtney is planning to leave for San Francisco from Dallas on Monday morning and has decided that she will either fly or take the train. There are five flights and two trains leaving for San Francisco from Dallas that morning. When she returns the following Monday, she will fly or ride with a friend. Two flights leave San Francisco to Dallas that afternoon. In how many ways can Courtney complete this round trip?

70. Maximize $P = 3x + y$
subject to: $2x + y \leq 35$
$2x \leq 5$
$x, y \geq 0$

71. How many different arrangements are possible with the letters in DUCK BILLED PLATYPUS if you ignore the blanks?

72. A box contains 15 golden nuggets, 7 silver nuggets, and 5 bronze nuggets.
a. How many different samples of eight contain exactly six golden nuggets?
b. How many samples of eight contain 5 bronze nuggets?

73. In how many ways can Tommy choose three different flavors of ice cream for his banana split from a list of 51 flavors?

74. Shade $A \bigcup (B \bigcap C^c)$

75. If you have nine unique cartons of ice cream–three quarts of vanilla, four quarts of chocolate, and two quarts of mint, how many different ways could you arrangement the ice cream in the freezer if each flavor stays together?

76. Find the maximum and minium value of $Z = 4x - 6y$ if your bounded feasible region has the corner points: $(1, 1)$, $(1, 3)$, $(3, 5)$, and $(1, 6)$.

77. Two six sided dice are thrown. What is the probability that one of the numbers shown is a two if the sum of the numbers is at least eight?

78. There is a box with six white socks, 10 blue socks and four red socks. Pick two socks. What is the probability of not picking a matching pair?

79. A bin contains eight numbers (0,1,5,6,8,8,9,9) and five letters (w,e,y,b,h), how many ways can they be arranged with no repeats?

80. A box has seven cubes, four spheres, 6 rectangles, and 12 cones. Pick 6 shapes out of the box, what is the probability of
a. all cubes?
b. picking exactly two spheres and four cones?
c. picking no rectangles?

81. A bag contains five purple, four red, and three green socks. Two socks are drawn without replacement.
a. What is the probability of the first sock being green?
b. What is the probability of the second sock being purple knowing the first sock was purple?

82. What is the center and radius if $(x + 8)^2 + (y - 3)^2 = 100$?

83. Solve for x, y, and z: $\begin{bmatrix} 1 & 5y-3 & 11 \\ 2 & 7 & 3 \\ 8 & 9 & z+12 \end{bmatrix} = \begin{bmatrix} x & 2 & 11 \\ 2 & 7 & 3 \\ 8 & 9 & -6 \end{bmatrix}$

84. A cookie company makes chocolate chip cookies and oatmeal raisin cookies. A batch of chocolate chip cookies requires 30 minutes of preparation and 65 minutes for baking. A batch of oatmeal raisin cookies require 45 minutes of preparation and 50 minutes for baking. There are 16,020 minutes available for preparation each day and 25,020 minutes available for baking each day. If the cookie company wants to perform at full capacity, how many of each type of cookie should be made each day?

85. "Maroon Out" shirts at Texas A&M cost \$8 each to produce and each shirt sells for \$14. If the fixed costs are $\$8,124$, what is the break even point?

86. As part of a campaign to promote its annual clearance sale, the Excelsior Company decided to buy television advertising time on station KAOS. Excelsior's advertising budget is $\$102,000$. Morning time costs \$3000 per minute, afternoons costs \$1000 per minute, and evenings (prime time) cost $\$12,000$ per minute. Because of previous commitments KAOS cannot offer Excelsior more than six minutes of prime time nor more than a total of 25 minutes of advertising time. Over the two weeks in which the commercials are to be run. KAOS estimates that morning commercials are seen by 200,000 people, afternoon commercials by 100,000 people, and evening commercials are seen by 600,000 people. How much morning, afternoon, and evening time should Excelsior buy to maximize exposure of its commercials?

87. What is the center and radius if $(x+3)^2+(y-2)^2=49$?

88. Three investments were made at 8%, 9%, and 12%. The total amount invested was \$3 million. The amount invested at 12% is four times as big as the amount invested at 8%. The investor ended up making $\$297,500$ on the investments. How much was invested at each rate?

89. A musician is not willing to perform in concert if the number of tickets sold is below 1500. For every 500 ticket increase the musician will perform two encores. Find the supply equation.

90. A bag of 50 marbles contains 10 red, 15 blue, 3 green, 6 pink, 8 yellow, and 8 black. If you grab 7 marbles out of the bag, what is the probability of
a. at least one pink marble?
b. no blue marbles?
c. each marble being a different color?
d. exactly 5 red and 2 green marbles?

91. One card is drawn, are events A "the card is a queen" and B "the card is a spade" independent?

92. The diameter of a circle is from $(5,6)$ to $(7,2)$. Find the equation of the circle if the center is $(6,4)$.

93. Four straws are chosen from a bag holding 8 red and 12 blue straws. What is the probability of drawing exactly three blue straws?

94. How many different salads can be made with lettuce, tomato, carrots, celery, and ranch dressing?

95. Roll a six sided die and a four sided die. Find the probability of a rolling a sum less than eight or a 3 or a 4 on ether die.

96. There are three red marbles, four green marbles, and eight blue marbles. What is the probability of drawing a green marble on the second draw without replacement?

97. A jar contains four red, five white, and 10 yellow marbles. If a person picks a red or a yellow marble, they will roll a standard six sided die. If the number rolled is a 4 or a five then the person wins. What is the probability of winning?

98. Three toys are drawn without replacement from a box containing seven cows and three horses. What is the probability of drawing exactly two cows?

99. A sandwich shop has 12 different condiments for a sandwich. How many different two condiment sandwiches are possible?

100. Mary Beth takes a math quiz and guesses on every question. The quiz has ten questions with four possible answers to each question. What is the probability that she will get at least seven of the ten answers correct?

101. It costs a shoe manufacturer \$12 to make one pair of shoes. There are fixed costs of $\$10,000$. Each pair of shoes sells for \$30.
a. Find the cost equation.
b. Find the revenue equation.
c. Find the profit equation.

102. A bag contains five red, three blue, and six yellow balloons. Four balloons are selected without replacement.
a. What is the probability of all red balloons?
b. What is the probability all are blue?
c. Find the probability that three are yellow and one is blue.

103. Find a line through the point $(5, 2)$ perpendicular to $y = \frac{3}{4}x + \frac{10}{4}$.

104. A box contains two defective Christmas tree lights and eight non defective. If the lights are selected one at a time without replacement and tested until both defective lights are found, what is the probability that both defective lights will be found after three trials?

105. It costs a manufacturer \$2.25 to make each bulletin board. The cost of labor, machinery, and tools is \$15000. If each bulletin board sells for \$8 find the
a. cost equation.
b. revenue equation
c. profit equation.

106. A small business borrowed money to remodel its facilities. The business borrowed a total of $\$145,000$. Some was borrowed at 5%, 6.5%, and 7%. How much was borrowed at each rate if the annual interest was $\$8,825$ and the amount borrowed at 5% was three times the amount borrowed at 7%?

107. A seven card hand is dealt from a deck of 15 purple, 10 blue, and seven green cards. What is the probability of being dealt exactly three purple, two blue and two green cards?

108. Solve the following system of equations:
$x + 2z = 4$
$-y + 3z = 0$
$-4x - 2y = 7$

109. A bucket contains 10 maroon balls and five white balls. If you draw two balls from the bucket, what is the probability that the second ball is maroon?

110. 150 eggs were hidden around the yard for the big Easter egg hunt. 60 are blue, 40 are pink, and 50 are yellow. What is the probability that Sam will find at least 7 blue if he picks up 15 eggs?

111. (SET UP BUT DO NOT SOLVE) Two types of movie tickets are sold. Type 1 costs \$8 per ticket and type 2 costs \$4.50 per ticket. The teller must sell at least 10,000 tickets, including at least 5000 of the \$8 tickets and 2000 of the \$4.50 tickets. The total of the receipts must be at least $\$225,000$ in order for the movie to show. The theater can hold 11,000 people. Find the system that best represents this problem.

112. Two hats are drawn without replacement from a box containing 10 red and five black hats. Let the random variable be the number of red hats drawn.
a. What are the values of the random variable.
b. Find the probability distribution.

113. Solve the following system of equations:
$-3x - 9y - 4z = 10$
$x + y - z = 14$

114. A box contains fifty CD's but five are defective. If you pick two at random
a. what is the sample space?
b. Describe the event "at least one is defective".

115. There are 2006 people who are employed by the Dallas Cowboys who maintain the team's equipment and Irving Stadium. Of those 2006 people, 106 live outside a radius of 33 miles which begins at the center of Irving Stadium. 53 people who live outside the radius are male. 1003 of the people who live inside the radius are male.
a. What is the probability that an employee lives outside the 33 mile radius and is male?
b. What is the probability that a male worker lives inside the 33 mile radius?

116. A company produces two shoes out of leather. Shoe one requires 2 meters of leather and shoe two requires 3 meters. There are 600 meters of leather available. Write the linear equation in general form.

117. A jar contains 5 red, 2 blue, and three green chips. Two chips are drawn at random without replacement. What is the probability that the second chip is green knowing the first is red?

118. Find the value of k that makes the following system have no solution:
$-4x + 6ky = 18$
$12x + 24y = 3$

119. At Baskin Robbins, the inventory freezer contains 10 gallons of chocolate, 8 gallons of mint chocolate chip, and 5 gallons of Gold Medal Ribbon ice cream. Four gallons are taken from inventory and stocked on the shelves. What is the probability that exactly two gallons of mint chocolate chip will be taken from inventory?

120. It costs a furniture store \$25 to make each chair. There is a fixed cost of \$20,000. The chairs sell for \$79 each.
a. Find the cost equation.
b. Find the revenue equation.
c. Find the profit equation.

121. There are twenty five true/false questions on an exam. The number of correct answers is recorded.
a. What is the probability of getting 20 correct?
b. What is the probability of getting at least twenty correct?
c. What is the probability of getting at most 15 correct?

122. 70% of the students at Texas A&M graduated from high school in the top 10% of their class. 60% of those who graduated in the top 10% are engineering majors and 15% of those who did not graduate in the top 10% are engineering majors. What is the probability that a student:
a. graduated in the top 10% or is an engineering major?
b. did not graduate in the top 10% given that the student is not an engineering major?
c. graduated in the top 10% and is not an engineering major?

123. Find the equation of a circle with a center at $(-3, 2)$ and a radius of 7.

124. Find $A^{-1} - 3B + C^T$ if

$$A = \begin{bmatrix} 4 & 1 & -3 \\ 6 & 5 & 2 \\ 1 & 2 & -1 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 7 & 9 \\ 3 & 2 & 0 \\ -4 & -2 & 7 \end{bmatrix} \qquad C = \begin{bmatrix} 3 & 9 & 7 \\ 2 & 6 & 8 \\ -1 & -2 & -3 \end{bmatrix}$$

125. If the diameter of a circle begins at $(1, 3)$ and it ends at $(4, 2)$. Give the equation of the circle if the center is $(\frac{5}{2}, \frac{5}{2})$.

126. $A = \begin{bmatrix} a & b & c \\ d & e & f \\ g & h & I \end{bmatrix} \qquad B = \begin{bmatrix} j & k & l \\ m & n & o \\ p & q & r \end{bmatrix}$

a. Find $A - B$.
b. Find A^T.
c. Find AB.

127. You borrowed \$225,000 from the bank to start your own business. You borrowed some of the money at 10%, some at 12.5% and some at 15%. How much was borrowed at each rate if the interest was \$26,625 and the amount borrowed at 10% was seven times the amount borrowed at 15%?

128. Find A^{-1} if $A = \begin{bmatrix} 7 & 4 \\ -1 & 2 \end{bmatrix}$

129. It costs a greeting card company \$.50 to make each card. There are fixed costs of \$5,500. The cards sell for \$2.75 each.
a. Find the cost equation.
b. Find the revenue equation.
c. Find the profit equation.

130. The following data represents the value of a computer from 1990 to 2003.

Year	1990	1993	1995	1998	2001	2003
Value	650	720	800	950	1050	1200

a. Find the line that best fits the data.
b. Find the value of a computer in 1980.
c. What year is the value \$900?

131. The local Aggie Mom's Club is making quilts to sell at their next parents meeting to raise money for scholarships. The women have 6 maroon fabrics, 3 white fabrics, and 4 gray fabrics to make the quilts. If each quilt can be made out of the eight fabrics, how many different quilts can be made using
a. exactly four maroon and two white fabrics?
b. exactly three white or exactly one gray fabric?

132. From 0000 to 8990 how many numbers
a. will include at least one three?
b. will include no more than two threes?

133. Twelve cards are to be selected from a standard deck. How many ways can this be done if you want
a. at least four hearts?
b. exactly two spades?
c. at most three diamonds?

134. Solve the following system of equations:
$x + y - 2z = 2$
$2x + 3y - z = 14$
$x + 2y + z = 16$
$3x + 4y - 4z = 8$

135. Find the equation for a circle with center $(4, -2)$ and a radius of five.

136. If $y = \frac{6}{4}x + \frac{7}{5}$ find a line
a. parallel through the point $(5, -1)$.
b. perpendicular through the point $(5, -1)$.

137. $U = \{a, b, c, d, e, f, g, h\}$, $A = \{a, e\}$, $B = \{a, b, g, h\}$, and $C = \{b, c, d, e, f, g\}$
a. Find $(A \bigcup B)^c$
b. Find $B \bigcap C$
c. Find $A \bigcup B \bigcap C$
d. Find $A \bigcap (B \bigcup C)$

138. Are the following lines parallel, perpendicular, or neither:
$y = \frac{1}{4}x - 10$
$y = .25x + 18$

139. A bag contains 18 diamonds, 13 rubies, 7 emeralds, and 12 pearls. In how many ways can you select a sample of six if
a. at least two of the jewels are emeralds?
b. exactly two of the jewels are the pearls?
c. none of the jewels are diamonds?

140. Find the matrix A such that
$A \begin{bmatrix} 1 & 0 \\ -1 & 3 \end{bmatrix} = \begin{bmatrix} -1 & -3 \\ 3 & 6 \end{bmatrix}$

141. $A = \begin{bmatrix} 4 & 9 \\ 5 & 2 \\ 8 & 7 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & 4 \\ 3 & 1 \end{bmatrix}$, find AB.

142. A sock drawer contains 12 white socks, 2 black socks, 4 not socks, 6 gray socks, and four dress socks. Four items are picked without looking and are not replaced. How many ways can you
a. pick exactly one pair of white socks?
b. pick one white, one black, and two dress socks?
c. pick at most one pair of not socks?

143. If you worked in a library and had to label each book by one upper case letter and one lower case letter, how many different books would you be able to label?

144. Solve for w, x, y, and z if $\begin{bmatrix} x+6 & 3 \\ 0 & 2y \end{bmatrix} + 3 \begin{bmatrix} 4 & w-1 \\ 2 & 9 \end{bmatrix} = \begin{bmatrix} 0 & z \\ 11 & 6 \end{bmatrix}^T$

145. A farmer has 650 acres of land available to raise carrots, squash, and cabbage. It takes two days to pick an acre of carrots, three days to pick an acre of squash, and two days to pick an acre of cabbage. There are forty days available for picking. The farmer makes a profit of \$100 per acre of carrots, \$160 per acre of squash, and \$210 per acre of cabbage. How many acres of each crop should be planted in order to maximize profits?

146. A total of $\$60,000$ is invested in two funds paying 7% and 10% simple interest. The 7% is a lower risk investment. The investor wants a yearly income of \$2500. What is the most that can be invested at 7%?

147. Shade the following:
a. $A \bigcup B \bigcup C$
b. $A \bigcap (B \bigcap C^c)$
c. $A^c \bigcap B^c \bigcap C^c$
d. $A \bigcup (B \bigcap C)^c$

148. Solve the following system of equations:
$5x - 3y + z = 48$
$-x + 2y - 6z = 56$
$9x - y + 3z = 28$

149. For a school bake sale a mom agrees to make 10 items (either cakes or batches of cookies). A cake requires four eggs and two cups of flour. A batch of cookies requires 2 eggs and one cup of flour. She has 28 eggs and 14 cups of flour. How many cakes and batches of cookies should she make?

150. Solve the following system of equations:
$x - 4y + 3z = 5$
$2x - 9y + 4z = 8$
$-8x + 2y = 9$

151. A farmer owns 200 cows that consume at least 100 lbs of a special feed daily. The feed is prepared as a mixture of corn and soybean meal with the following composition:

feed	*calcium*	*protein*	*fiber*	*cost*
corn	.004	.1	.03	.25
soybean	.006	.8	.07	.65

The dietary requirements of the cows are: at most 2% calcium, at least 35% protein, and at most 10% fiber. Determine the daily minimum cost of the feed.

152. When a car is purchased, it costs $\$60,000$. In ten years it will be worth $\$20,000$. Using straight line depreciation find the value of the car in six years.

153. How many distinct ways can the letters in the word Inexpensive be arranged?

154. A business purchased a delivery truck for $\$36,000$ in 1995. Its salvage value is $\$4,000$ in 2005. How much will it be worth in 2000 using straight line depreciation?

155. How many ways can you rearrange the letters in the word sunshine?

156. Find the matrix representation for the following system of equations and use the inverse to solve:
$x + y - 3z = 1$
$4x - 16y + z = 2$
$-6x + y = 10$

157. Given the points $(4, 6)$ and $(-1, 3)$,
a. Find the line through the points.
b. Is the point $(3, 2)$ on the line?
c. Find the parallel line through $(-3, 1)$.
d. Find the perpendicular line through $(6, 4)$.

158. Find the number of distinguishable permutations that can be formed from the letters in the word COMMUNICATION.

159. Solve the following system of equations:
$2x + 3y - z = 14$
$x - y + 4z = 7$
$-x + 8y + z = 6$

160. Bell manufacturers its product at a cost of \$10 per unit and sells them for \$24 per unit. The company has a fixed cost of $\$14,000$ per month. What is the company's break even point?

161. 200 people on a plane were asked what they wanted to eat: pretzels (A), hot pockets (B), or grilled cheese (C).
46 said none
22 said all three
58 said hot pockets and grilled cheese
90 said grilled cheese
92 said at least two
26 said pretzels and grilled cheese but not hot pockets
148 said pretzels or hot pockets.
67 said grilled cheese or hot pockets but not pretzels
a. Find $n(A \bigcup B^c)$
b. Find the number of people how ordered only grilled cheese.

162. Find the equation of the circle with its center at the origin and it passes through the point $(2, 6)$.

163. A nail polish company has a fixed cost of $\$20,000$, a production costs of \$5 per bottle of polish, and sells the nail polish for \$8 each.
a. Find the revenue equation.
b. Find the cost equation.
c. Find the profit equation.

164. A construction science student needs to build a model community for one of his class projects. He is going to put model houses and model businesses in it. Each house is going to cost \$50, take 4 hours to build, and eight hours to set. Each business is going to cost \$25 to build, take six hours to build, and five hours to set. He has 48 hours to build, 60 hours to set, and 500 dollars to spend on the project. What is the maximum number of houses and businesses that he can build? (HINT: MAX Z=x+y where x is the number of houses and y is the number of businesses).

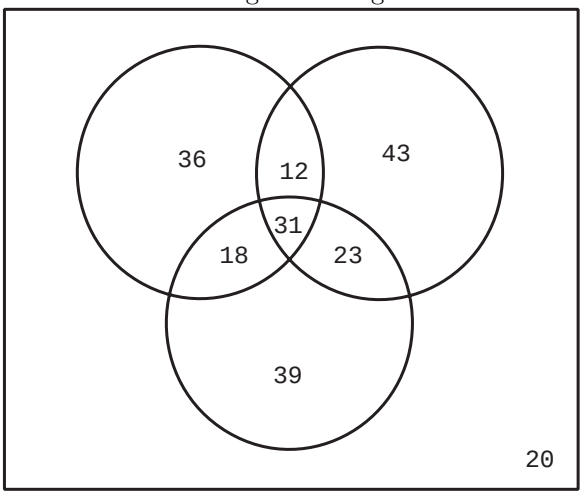
165. A bag contains 15 green, 14 red, 12 purple, and 13 pink balls. How many different samples of 9 contain
a. exactly 6 red balls?
b. no more than 6 purple balls?
c. 3 green and 2 red balls?

166. A man buys a new car in 1996 for $\$32,995$ when he sells the car in 2002 it is worth $\$2,500$. using linear depreciation, determine how much the car would have been worth if he sold it two years earlier.

167. A vendor sells ice cream ar a baseball game. She offers coffee, vanilla, rocky road, or chocolate served in either a plain cone,, waffle cone, or a cup. How many different single scoops of ice cream can you buy from her?

168. A new house is bought for $\$150,000$. Twenty years later it sells for $\$85,000$. Find the equation for the value of the house using straight line depreciation.

169. Use the following Venn diagram to answer the following questions.



a. $n(A \bigcup B)$
b. $n((A \bigcup B \bigcup C)^c)$
c. $n(A \bigcap B \bigcap C)$
d. $n((A \bigcap B) \bigcup (B \bigcap C))$

170. 800 items are sold for \$25 each. 2000 items are sold for \$15 each. Find the demand equation.

171. A box contains two red, four green, and three blue balls. In how many ways can a sample of four balls be selected if exactly one ball is red and at least one green ball is drawn?

172. People listen to three types of music: country, rap, and alternative. 110 people were surveyed and found:
18 people don't listen to any
22 people listen to rap and alternative
5 people listen to all three types
19 people listen to only country and alternative
27 listen to rap but not country nor alternative
7 listen only to country
65 people listen to country or alternative
11 people listen to rap and country but not alternative
a. How many people listen to rap and country?
b. How many people listen only to rap?

173. A large piece of construction machinery is purchased for \$1.3 million. In 15 years it is worth only 30% of the original purchase price. What is its value in 11 years?

174. $10,000$ computers are sold for $\$1,000$ each. If the price goes up \$200, 7,500 units will sell. Find the demand equation.

175. How many three digit numbers can be formed from the digits 2,3,4,5,6,7 if the numbers formed must all be even and no digit may be repeated?

176. Given the line $4x + 2y = 16$, find
a. the line perpendicular through the point $(2, 4)$.
b. the line parallel through the point $(1, 1)$.

177. A bag is filled with 10 quarters, 15 dimes, 5 nickels, and eight pennies. How many different samples of ten contain exactly nine dimes?

178. The following is a record of the change in a car's value over time.

year	1994	1999	2002	2003
value	$40,000$	$28,000$	$20,800$	$18,400$

a. Find the line that best fits the data.
b. Find the value of the car in 2006.
c. What year is the value $\$32,000$

179. A bag contains 30 red, 35 green, 32 blue, and 28 yellow balls. How many samples of 40 balls may be selected if
a. at least 6 are red?
b. at most 6 are red?
c. six are yellow and at least three are red?

180. Solve for x, y, and z if $\begin{bmatrix} 3x+4 & -8 & 12 \\ 5 & -1.5z & y+3 \\ 4 & 4 & 0 \end{bmatrix} = \begin{bmatrix} -7 & -8 & 12 \\ 5 & 9 & -2.5 \\ 4 & 4 & 0 \end{bmatrix}$

181. Find the value for k that will give this system of equations infinitely many solutions:
$2x + 4y = 2$
$4x + ky = 4$

182. Based on the rules of operations which sets are the same?
a. $(A^c)^c \bigcup B^c$
b. $(A \bigcup B)^c$
c. $(A^c \bigcup B^c)^c$
d. $(A^c \bigcup B^c)$
e. $A \bigcup B$
f. $(A \bigcap B)^c$
g. $A^c \bigcap B^c$
h. $A \bigcup B^c$

183. Find $-4A + 3B - C$ if
$A = \begin{bmatrix} 2 & 4 \\ 5 & 6 \end{bmatrix}$ $B = \begin{bmatrix} 0 & 1 \\ 4 & 2 \end{bmatrix}$ $C = \begin{bmatrix} 6 & 7 \\ 2 & 0 \end{bmatrix}$

184. A company runs three production lines for a total output of 45 parts/hour. Twice the production of the first line is equal to the combined output of the other two lines. The output of the second line is 4 parts/hour more than that of the third line.
a. Define the variables.
b. Write the system of equations that will find the production rate of each line.

185. Find the line through $(0, 4)$ parallel to $5x - y = 2$

186. Solve the following system of equations using the inverse:
$2x + 3y - z = 6$
$6x - y - 4z = -2$
$3x + 2z = 10$

187. Find the value of the item in 2009 if

year	1990	1993	1996	1999	2002
value	10	15	20	25	30

188. How many eight digit numbers can be made if
a. Zero cannot be the first or last digit?
b. the first number is eight, the second is three, and the last is seven?

189. The tables in the cafeteria are to be labeled with a capital letter and an odd integer number not exceeding 100. What is the largest number of chairs that can be labeled differently?

190. There is no demand for a certain CD when the unite price is \$15. When the unit price is \$10, the quantity demanded is 8000 a week. The suppliers will not market any CD's if the unit price is \$2 or lower. At \$5 a CD, however, the manufacturer will make 6000 CD's available each week.
a. Find the linear supply equation.
b. Find the linear demand equation.
c. Find the equilibrium point.

191. Little Billy (age 6) has created a multi-thousand dollar lemonade business in his neighborhood. Friends started to catch wind of his success and were interested in borrowing money from Billy. Billy decided to issue loans with value up to \$5000. Having three different types of loans: loan A was \$1000 with a 5% interest rate, loan B was \$2500 with a 7% interest rate, and loan C was \$5000 with a 10% interest rate. Knowing Billy issues a total of 15 loans and four of them are type A, how many are type B and C if he will receive \$3750 in interest payments?

192. Solve the following system of equations:
$5x + 9y + 2z = 8$
$4y + 8z = 12$

193. The following table represents the price of tuition per given year

year	1984	1985	1990	1999	2000	2003
tuition	960	975	980	1000	1100	1144

a. Find the best fit line.
b. What year was the tuition \$978?
c. How much will tuition be in 2012?
d. How much was tuition in 1975?

194. Two banks are advertising in a local paper. You have \$500 to deposit into a checking account. Bank A is advertising 2% compounded monthly. Bank B is advertising 1.98% compounded daily.
a. What is the effective rate of bank A?
b. What is the effective rate of bank B?
c. Which bank should you invest your money to get the best interest rate?
d. Assuming you deposit the money in the bank with the best interest rate, how much money will you have in five years?

195. \$600 is invested in an account compounding quarterly at 4.3%. After ten years how much money will be in the account?

196. Suzy borrows $\$5,000$ from a bank that charges 3% interest per month to help pay for school. She cannot make her first payment for the next four years.
a. How much will she owe the bank when she graduates?
b. After graduation, if she pays \$400 a month, when will her loan be paid off?

197. Gwen is ready to start saving money for her wedding. She deposits \$100 every quarter in a mutually fund that compounds quarterly at 12%. How much money will she have saved in 5 years?

198. Michael needs $\$50,000$ in ten years. How much money should he deposit in an account that compounds weekly at 1%?

199. The Stanford-Binet IQ test is scaled to give a mean score of 100 with a standard deviation of 16.
a. What is the probability of a student having an IQ less than 80?
b. What is the probability of a student having an IQ greater than 145?

200. A college professor teaches CHEM 101 and uses past exams that are normally distributed with a mean of 70 and a standard deviation of 12. She decides 15% will get A's, 20% B's, 40% C's, 15% D's, and 10%.
a. Where is the cut off between the A's and B's?
b. Where is the cut off between the B's and C's?
c. Where is the cut off between the C's and D's?
d. Where is the cut off between the D's and F's?