MATH 1324 MyLab Math Mid-Term Exam Study Sheet

Learning and practice has occured using the student resources and graded assignments in this course. When studying math you should not study in order, practice using the eText and MLM HW assignments. If you can work the questions without your notes correctly then you are ready for an exam, otherwise seek help and ask questions. MLM exams have 12 to 20 questions.

NOTE: This study sheet may reflect some exam questions, however, this study sheet may not reflet every type of question that may be included on the exam.

Use a Venn Diagram and the given information to determine the number of elements in the indicated region.

1. At Southern States University (SSU) there are 399 students taking Finite Mathematics or Statistics. 238 are taking Finite Mathematics, 184 are taking Statistics, and 23 are taking both Finite Mathematics and Statistics. How many are taking Finite Mathematics but not Statistics?

Convert the given i–system to an e–system using slack variables. Then construct a table of all basic solutions of the e–system. For each basic solution, indicated whether or not it is feasible.

2. $x_1 + 2x_2 \le 14$

   $4x_1 + x_2 \le 16$

   $x_1, x_2 \ge 0$

Solve the problem.

3. A software company employs 9 sales representatives and 8 technical representatives. How many ways can the company select 5 of these employees to send to a computer convention if at least 4 technical representatives must attend the convention?

4. A small company that makes hand–sewn leather shoes has fixed costs of $320 a day, and total costs of $1200 per day at an output of 20 pairs of shoes per day. Assume that total cost C is linearly related to output x. Find an equation of the line relating output to cost. Write the final answer in the form $C = mx + b$.

5. For the following initial simplex tableau, identify the basic and nonbasic variables. Find the pivot element, the entering and exiting variables, and perform one pivot operation.

	x	y	s_1	s_2	P	
s_1	3	5	1	0	0	15
s_2	4	1	0	1	0	4
P	–15	–10	0	0	1	0

6. A survey of residents in a certain town indicates 170 own a dehumidifier, 130 own a snow blower, and 80 own a dehumidifier and a snow blower. How many own a dehumidifier or a snow blower?

7. A restaurant offered pizza with 3 types of crusts and 7 different toppings. How many different types of pizzas could be offered?

8. How many different five–letter code words are possible from the first ten letters of the alphabet if the first letter cannot be a vowel and adjacent letters must be different.

9. A company that manufactures laser printers for computers has monthly fixed costs of $177,000 and variable costs of $650 per unit produced. The company sells the printers for $1,250 per unit. How many printers must be sold each month for the company to break even?

Identify the row operation that produces the resulting matrix.

10. $\left[\begin{array}{cc|c} 3 & 0 & 9 \\ -2 & 4 & 8 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 3 & 0 & 9 \\ 0 & 2 & 7 \end{array}\right]$

Solve the inequality and graph. Express your answer in interval notation.

11. $-3(3x - 2) < -12x - 21$

Find the values of a, b, c, and d that make the matrix equation true.

12. $\begin{bmatrix} 1 & 2 \\ 0 & -1 \end{bmatrix}\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$

Use graphical methods to solve the linear programming problem.

13. Minimize $z = 4x + 5y$
    subject to: $2x - 4y \le 10$
                     $2x + y \ge 15$
                     $x \ge 0$
                     $y \ge 0$

Solve using Gauss–Jordan elimination.

14. $x + y + z = 1$
    $x - y + 5z = 23$
    $5x + y + z = -11$

Perform the indicated row operations on the following matrix.

$$\left[\begin{array}{cc|c} 1 & -5 & 4 \\ 2 & 2 & 5 \end{array}\right]$$

15. $(-2)R_1 + R_2 \rightarrow R_2$

Graph the solution set of the system of linear inequalities and state if the solution region is bounded or unbounded.
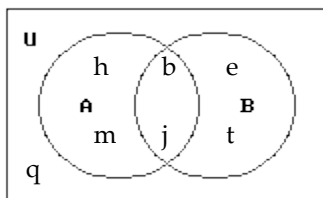
16. $x \le -4$
    $y > 2$
    $3x + y < 6$

Perform the indicated operations given the matrices.

17. Let $C = \begin{bmatrix} 1 \\ -3 \\ 2 \end{bmatrix}$ and $D = \begin{bmatrix} -1 \\ 3 \\ -2 \end{bmatrix}$; $C - 4D$

Use the Venn diagram to find the requested set.

18. Find $A \cup B$.


2

Solve the problem.

19. A hospital dietitian wants to insure that a certain meal consisting of rice, broccoli, and fish contains exactly 26,800 units of vitamin A, 840 units of vitamin E, and 11,160 units of vitamin C. One ounce of rice contains 400 units of vitamin A, 20 units of vitamin E, and 180 units of vitamin C. One ounce of broccoli contains 800 units of vitamin A, 60 units of vitamin E, and 540 units of vitamin C. And one ounce of fish contains 2,400 units of vitamin A, 40 units of vitamin E, and 810 units of vitamin C. How many ounces of each food should this meal include? Set up a system of linear equations and solve using Gauss–Jordan elimination.

20. Write the equation of a line that passes through $(-1, 4)$ and $(5, -1)$. Write the final answer in the form $Ax + By = C$.

21. Solve the following linear programming problem using the simplex method:

    Maximize $\quad P = 7x_1 + 2x_2 + x_3$

    subject to:

    $$x_1 + 5x_2 + 7x_3 \le 8$$
    $$x_1 + 4x_2 + 11x_3 \le 9$$
    $$x_1, x_2, x_3 \ge 0$$

22. A vineyard produces two special wines a white, and a red. A bottle of the white wine requires 14 pounds of grapes and 1 hour of processing time. A bottle of red wine requires 25 pounds of grapes and 2 hours of processing time. The vineyard has on hand 2,198 pounds of grapes and can allot 160 hours of processing time to the production of these wines. A bottle of the white wine sells for $11.00, while a bottle of the red wine sells for $20.00. How many bottles of each type should the vineyard produce in order to maximize gross sales? (Solve using the geometric method.)

23. Formulate the dual problem for the linear programming problem:

    Minimize $\quad C = 6x_1 + x_2 + 5x_3$

    $$8x_1 + x_2 \ge 2$$

    subject to: $\quad 8x_2 + 5x_3 \ge 16$

    $$x_1, x_2, x_3 \ge 0$$

24. Results of a survey of fifty students indicate that 30 like red jelly beans, 29 like green jelly beans, and 17 like both red and green jelly beans. How many of the students surveyed like neither red nor green jelly beans?

25. Find the slope of the line $3x + 4y = 11$.

26. Use the simplex method to solve the linear programming problem.

    Minimize $\quad w = 5y_1 + 2y_2$

    subject to: $\quad y_1 + y_2 \ge 19.5$

    $$2y_1 + y_2 \ge 24$$
    $$y_1 \ge 0, y_2 \ge 0$$

User row operations to change the matrix to reduced form.

27. $\begin{bmatrix} 1 & -1 & 0 & | & 1 \\ 0 & 4 & 8 & | & 4 \\ 0 & 0 & 0 & | & 0 \end{bmatrix}$

28. $\begin{bmatrix} 1 & 0 & | & 2 \\ -1 & 1 & | & 3 \end{bmatrix}$

Use the Venn diagram below to find the number of elements in the region.
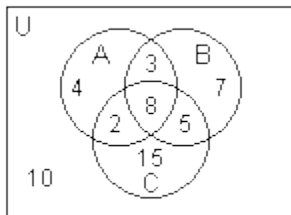
29. $n((A \cup B) \cap C)$

1. 215

2. $x_1 + 2x_2 + s_1 \quad = 14$

   $4x_1 + x_2 + s_2 = 16$

	x_1	x_2	s_1	s_2
(A)	0	0	14	16
(B)	0	7	0	9
(C)	0	16	–18	0
(D)	14	0	0	–40
(E)	4	0	10	0
(F)	$\dfrac{18}{7}$	$\dfrac{40}{7}$	0	0

   Feasible: (A), (B), (E), (F)
   Not feasible: (C), (D)

3. 686

4. $C = 44x + 320$

5. Basic: s_1, s_2, P; nonbasic: x, y;

$$
\begin{array}{c|ccccc|c}
 & x & y & s_1 & s_2 & P & \\
\hline
s_1 & 3 & 5 & 1 & 0 & 0 & 15 \\
s_2 & (4) & 1 & 0 & 1 & 0 & 4 \\
\hline
P & -15 & -10 & 0 & 0 & 1 & 0
\end{array}
$$
Enter x, Exit s_2

$$
\begin{array}{c|ccccc|c}
 & x & y & s_1 & s_2 & P & \\
\hline
s_1 & 0 & \dfrac{17}{4} & 1 & -\dfrac{3}{4} & 0 & 12 \\
x & 1 & \dfrac{1}{4} & 0 & \dfrac{1}{4} & 0 & 1 \\
\hline
P & 0 & -\dfrac{25}{4} & 0 & \dfrac{15}{4} & 1 & 15
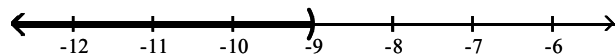\end{array}
$$

6. 220

7. 21

8. 45,927

9. 295 printers per month

10. $\left(\dfrac{1}{3}\right)R_1 + \left(\dfrac{1}{2}\right)R_2 \to R_2$

11. $(-\infty, -9)$

12. $\begin{bmatrix} 5 & 10 \\ -2 & -4 \end{bmatrix}$
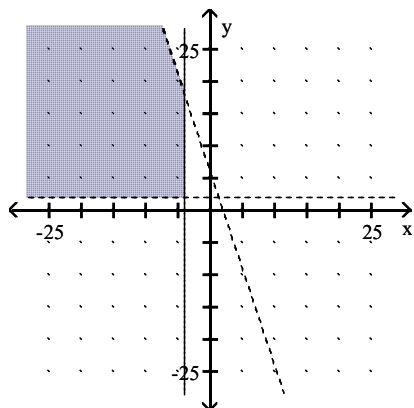
13. Minimum of 33 when $x = 7$ and $y = 1$

14. $(-3, -1, 5)$

15. $\left[\begin{array}{cc|c} 1 & -5 & 4 \\ 0 & 12 & -3 \end{array}\right]$

16. Unbounded

17. $\begin{bmatrix} 5 \\ -15 \\ 10 \end{bmatrix}$

18. {e, b, j, h, m, t}

19. 5 ounces rice, 7 ounces broccoli, 8 ounces fish

20. $5x + 6y = 19$

21. Max $P = 56$ when $x_1 = 8$, $x_2 = 0$, $x_3 = 0$

22. 132 bottles of white wine, and 14 bottles of red wine

23. Maximize $\qquad P = 2y_1 + 16y_2$

subject to

$$8y_1 \le 6$$
$$y_1 + 8y_2 \le 1$$
$$5y_2 \le 5$$
$$y_1, y_2 \ge 0$$

24. 8

25. $-\dfrac{3}{4}$

26. 48 when $y_1 = 0$ and $y_2 = 24$

27. $\begin{bmatrix} 1 & 0 & 2 & | & 2 \\ 0 & 1 & 2 & | & 1 \\ 0 & 0 & 0 & | & 0 \end{bmatrix}$

28. $\begin{bmatrix} 1 & 0 & | & 2 \\ 0 & 1 & | & 5 \end{bmatrix}$

29. 15