Show work. Your work is part of your answer. You may use a calculator.

Name: \_\_\_\_\_

- 1. Write as an augmented matrix. Row reduce (to RREF). Interpret your result.
  - $\left\{ \begin{array}{rrr} 2x & +4y & = -2 \\ 6x & +y & = 16 \end{array} \right.$

2. An economy is based on two industrial sectors, coal and steel. Production of a dollar worth of coal requires an input of \$0.30 from the coal sector and \$0.20 from the steel sector. Production of a dollar worth of steel requires an input of \$0.20 from the coal sector and \$0.50 from the steel sector. Find the output for each sector that is needed to satisfy a final demand of \$10 billion for coal and \$20 billion for steel.

- 3. Graph the feasible region and find the corner points for the following. Is the region bounded or unbounded? Maximize the function P = 4x + 3y subject to
  - $\begin{cases} 5x +3y \leq 60\\ 3x +5y \leq 50\\ x \geq 0\\ y \geq 0 \end{cases}$

- 4. Graph the feasible region and find the corner points for the following. Is the region bounded or unbounded? Maximize the function P = 4x + 3y subject to
  - $\begin{cases} 2x + y \leq 6\\ x + y \geq 8\\ x & 2 \\ x & 2 \\ y & 2 \\ y & 2 \\ \end{cases}$

5. Use the Simplex method to solve. Maximize  $P = 15x_1 + 20x_2$  subject to

 $\begin{cases} 2x_1 + x_2 \leq 9\\ x_1 + x_2 \leq 6\\ x_1 + 2x_2 \leq 10\\ x_1 & \geq 0\\ x_1 & \geq 0\\ x_2 & \geq 0 \end{cases}$ 

6. Use the Simplex method to solve. Maximize  $P = 4x_1 + 3x_2$  subject to

 $\begin{array}{rcl}
10x_1 & +6x_2 & \leq 120 \\
6x_1 & +10x_2 & \leq 100 \\
x_1 & & \geq 0 \\
& & x_2 & \geq 0
\end{array}$ 

7. How many 3-letter code words can be formed from the first 5 letters of the alphabet if no letter can be used more than once?

8. How many 3-letter code words can be formed from the first 5 letters of the alphabet if we can repeat letters?

9. We are forming a basketball team from the class. We have 14 students and we select five players. How many ways can we select 5 out of the fourteen students?

10. Now that we have five students for the basketball team. We assign positions to the players. We have a C, SF, PF, SG and PG. How many ways can we assume the five positions to the five students?

11. A high school football team with 60 players includes 20 players who played offense last year, 20 who played defense last year, and 25 who were not on last year's team.

How many players from last year played both offense and defense?

12. Let the universal set U be the set of all 120 students in the class, A the set of students from the College of Arts & Sciences, B the set of students from the College of Business, F the set of freshmen, and S the set of sophomores.

	Freshmen	Sophomores
Arts & Sciences	19	14
Business	66	21

What are the following?

- (a) n(F) =(b) n(A) =
- (c)  $n((A \cup S)^c) =$

• Leontief Input output matrices

 $X = (I - M)^{-1}D$