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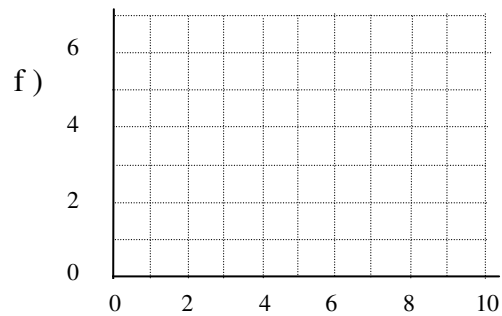
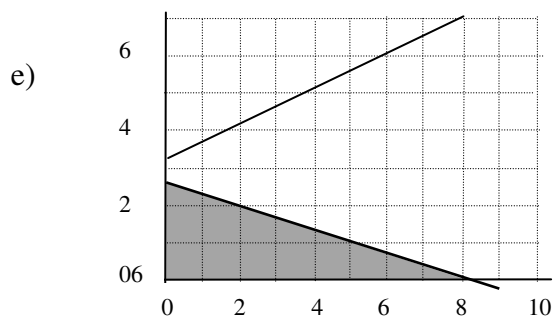
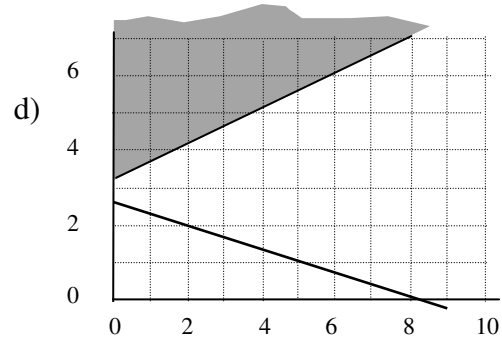
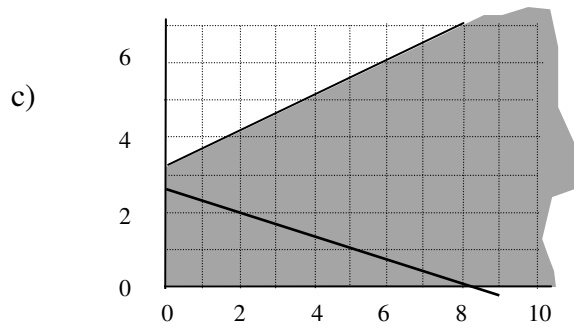
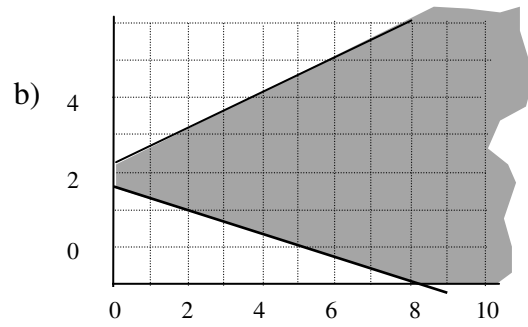
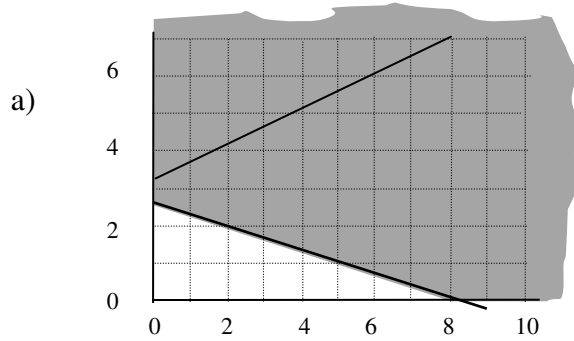
MATH 1090 TEST 3

instructor:
 50 minutes with calculator

Work problems completely, either on this paper, or on another sheet, which you include with this paper.
 Credit will be given for work. Circling correct answer without work to support the answer will not receive credit.
 If you turn in work on another paper, number the problems so they can be found and read.
 If you answer "none of the preceding," tell what the answer should be.

1. Determine the solution for

$$\begin{aligned} 3x - 7y &\geq -24 \\ x + 3y &\geq 8 \\ x &\geq 0, y \geq 0 \end{aligned}$$



none of the preceding

2. Find the solution to the system

$$\begin{aligned} 2x + y - 3z &= 1 \\ x - y + 2z &= 1 \\ 5x - 2y + 3z &= 6 \end{aligned}$$

a) $\left(\frac{-z}{3}, \frac{-7z}{3}, z\right)$

b) (1, 2, 1)

c) $\left(\frac{1}{3}, \frac{-7}{3}, -1\right)$

d) $\left(\frac{z}{3}, \frac{7z}{3}, z\right)$

e) no solution

f) none of the preceding

3. David has a total of \$2000 on deposit with two savings institutions. One pays interest at the rate of 6% a year, whereas the other pays interest at the rate of 8% a year. If he earned a total of \$144 interest during a single year, how much does he have on deposit in each institution?

- a) \$800 at 6%, \$1200 at 8% b) \$750 at 6%, \$1250 at 8% c) \$1400 at 6%, \$600 at 8%
 d) \$1200 at 6%, \$800 at 8% e) \$1250 at 6%, \$750 at 8% f) none of the preceding

4. Deluxe River Cruises operates a fleet of river vessels. The fleet has two types of vessels: each type-A vessel has 60 deluxe cabins and 160 standard cabins, whereas each type-B vessel has 80 deluxe cabins and 120 standard cabins. Under the charter agreement with Odyssey Travel Agency, Deluxe River Cruises is to provide Odyssey with a minimum of 360 deluxe and 680 standard cabins for their 15-day cruise in May. It costs \$44,000 to operate a type-A vessel and \$54,000 to operate a type-B vessel for that period. Identify the objective function and system of constraints that give the number of each type of vessel that should be used in order to keep the operating costs to a minimum.

- a) Minimize: $C = 44,000A + 54,000B$
 subject to: $360 \leq 60A + 80B$
 $680 \leq 160A + 120B$
 $A \geq 0, B \geq 0$
- b) Minimize: $C = 44,000A + 54,000B$
 subject to: $360 \geq 60A + 80B$
 $680 \geq 160A + 120B$
 $A \geq 0, B \geq 0$
- c) Minimize: $C = 44,000A + 54,000B$
 subject to: $360 \leq 60A + 160B$
 $680 \leq 80A + 120B$
 $A \geq 0, B \geq 0$
- d) Minimize: $C = 44,000A + 54,000B$
 subject to: $360 \geq 60A + 160B$
 $680 \geq 80A + 120B$
 $A \geq 0, B \geq 0$
- e) none of the preceding

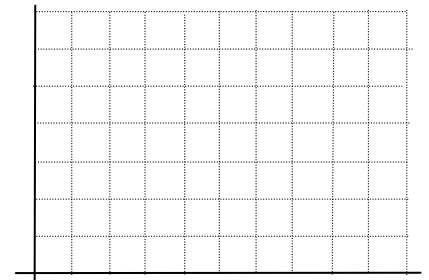
5. Find the solution to the system
$$\begin{array}{rcl} 2x & & + 3z = -1 \\ 3x & - & 2y + z = 9 \\ x & + & y + 4z = 4 \end{array}$$

- a) (4, 0, -3) b) (-20, -28, 13) c) $\left(\frac{31}{7}, \frac{1}{2}, \frac{-23}{7}\right)$
 d) $\left(-2z + 6, \frac{-3z-4}{2}, z\right)$ e) no solution f) none of the preceding

6. Jackson Farms has allotted a certain amount of land for cultivating soybeans, corn, and wheat. Cultivating 1 acre of soybeans requires 2 labor-hours, and cultivating 1 acre of corn or wheat requires 6 labor-hours. The cost of seeds for 1 acre of soybeans is \$12, for an acre of corn is \$20, and for wheat is \$8. If all resources are to be used, how many acres of each crop should be cultivated if 1000 acres of land are allotted, 4400 labor-hours are available, and \$13,200 is available for seeds?

7. Kane Manufacturing has a division that produces two models of fireplace grates – model A and model B. To produce each model A grate requires 3 lb of cast iron and 6 min of labor. To produce each model B grate requires 4 lb of cast iron and 3 min of labor. The profit for each model A grate is \$2.00 and the profit for each model B grate is \$1.50. 1000 lb of cast iron and 20 labor-hours are available for the production of the fireplace grates per day. Write the system of constraints and the objective function used to determine how many grates of each model the division should produce each day to maximize its profit. (Solve the problem in problem in #8 below.)

8. Use the linear program from #7 above to determine the number of each model of grate that maximizes the division's profit. (Use the graph to visualize the problem.)



9. K & R Builders builds three models of houses M_1 , M_2 and M_3 , in three subdivisions I, II and III located in three different areas of the county. The prices of the houses (in \$1000) are given in matrix A. If K & R Builder decides to raise the price of each house by 3%:

$$A = \begin{matrix} & M_1 & M_2 & M_3 \\ \text{I} & 340 & 360 & 380 \\ \text{II} & 410 & 430 & 440 \\ \text{III} & 620 & 660 & 700 \end{matrix}$$

- a. Write the equation to find matrix B that show the new prices.
- b. Write matrix B that gives the new prices of the houses.

10. Suzanne operates three self-service gasoline stations in different parts of town. On a certain day, the sales were:

	gallons sold			
	Premium	Super	Regular	Diesel
Station A	600	800	100	700
Station B	700	600	1200	400
Station C	900	700	400	800

The prices that day were:

dollars per gallon			
Premium	Super	Regular	Diesel
3.20	2.98	2.80	3.10

- a. Write the matrix multiplication that gives the total revenue for each station.
- b. Use the multiplication to find the total revenue for each station.

