Math 199
Fall, 2004 Name:
Systems of Linear Equations

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1. Solve the following systems of linear equations:

   (a)
   $$x - 2y = 5$$
   $$2x + y = 3$$

   (b)
   $$2x + 3y = 15$$
   $$8x + 12y = 40$$

   (c)
   $$3x - 2y = 4$$
   $$6x - 4y = 8$$

   (d)
   $$9x - 5y = 1$$
   $$-18x + 10y = 1$$

   (e)
   $$\frac{x}{2} + \frac{y}{3} = 8$$
   $$\frac{2x}{3} + \frac{3y}{2} = 17$$

   (f)
   $$x + 2y = 0$$
   $$y - x = 2$$
   $$x + y + z = -2$$

   (g)
   $$x + 2y + 3z = 8$$
   $$3x - y + 2z = 5$$
   $$-2x - 4y - 6z = 5$$

(h)

$$x + 2y + 4z = 6$$
$$y + z = 1$$
$$x + 3y + 5z = 10$$

2. A knitting shop ordered yarn from three suppliers, I, II, and III. One month the shop ordered a total of 100 units of yarn from these suppliers. The delivery costs were \$80, \$50, and \$65 per unit, respectively, with total delivery costs of \$5990. The shop ordered the same amount from suppliers I and III. how many units were ordered from each supplier?

3. An electronics company produces transistors, resistors, and computer chips. Each transistor requires 3 units of copper, 1 unit of zinc, and 2 units of glass. Each resistor requires 3, 2, and 1 units of the three materials, and each computer chip requires 2, 1, and 2 units of these materials, respectively. How many of each product can be made with 810 units of copper, 410 units of zinc, and 490 units of glass?

4. An auto manufacturer sends cars from two plants, I and II, to dealerships A and B located in a midwesterner city. Plant I has a total of 28 cars to send, and plant II has 8. Dealer A needs 20 cars, and dealer B needs 16. Transportation costs based on the distance of each dealership from each plant are \$220 from I to A, \$300 from I to B, \$400 from II to A, and \$180 from II to B. The manufacturer wants to limit transportation costs to \$10,640. How many cars should be sent from each plant to each of the two dealerships?

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1. Suppose that the supply and demand for printed baseball caps in a resort town for a particular week are

$$p = 0.4q + 3.2 \qquad \text{supply equation}$$

$$p = -1.9q + 17 \qquad \text{demand equation}$$

where p is the price in dollars and q is the quantity in hundreds.

   (a) Find the supply and the demand if the baseball caps are priced at $4 each.

   (b) Find the supply and demand if the baseball caps are priced at $9 each.

   (c) Find the equilibrium price and quantity.

2. At $1.40 per bushel, the daily supply for oats is 850 bushels, and the daily demand is 580 bushels. When the price falls to $1.20 per bushel, the daily supply decreases to 350 bushels and the daily demand increases to 980 bushels. Assume that the supply and the demand equations are linear.

   (a) Find the supply equation

   (b) Find the demand equation

   (c) Find the equilibrium price and quantity.

3. A coffee manufacture uses Colombian and Brazilian coffee beans to produce two blends, robust, and mild. A pound of the robust blend requires 12 ounces of Colombian beans and 4 ounces of Brazilian beans. A pound of the mild blend requires 6 ounces of Colombian beans and 10 ounces of Brazilian beans. Coffee is shipped in 132-pound burlap bags. The company has 50 bags of colombian beans and 40 bags of Brazilian beans on hand.

   (a) How many pounds of each blend should they produce in order to use all the available beans?

   (b) If the company decides to discontinue production of the robust blend and produce only the mild blend, how many pounds of the mild blend can they produce and how many beans of each type will they use? Are there any beans that are not used?

   (c) Repeat part (b) if the company decides to discontinue production of mild blend and produce only the robust blend.