

# INTERMEDIATE ALGEBRA

+2

GPS #14

## 4.1/4.2 SYSTEMS OF LINEAR EQUATIONS IN TWO VARIABLES I

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### Useful Guidelines:

\* Solving a System by Elimination

Step 1: Write both equations in standard form  $Ax + By = C$ .

Step 2: Make the coefficients of one pair of variable terms opposites.

Step 3: Add the new equations to eliminate a variable. Then solve for the remaining variable.

# When two lines intersect in a single point, the coordinates of this point give the only solution of the system. Then the system is consistent, and the equations are independent.

# When the lines are parallel to each other, the system is inconsistent and the solution set is an empty set.

# When the lines are overlapped on each other. The equations are dependent. The solution set is an infinite Set of ordered pairs representing the points on the line.

*W/ Good*  
*W/ h.*

1. Solve each system by elimination. Is the system consistent, inconsistent or has dependent equations?

a)  $3x + 2y = 13$

$(4x - y = -1) \cdot 2$

$\Rightarrow 3x + 2y = 13$  ①

$\Rightarrow 8x - 2y = -2$  ②

Add them ① + ②

$11x = 11$

$x = 1$

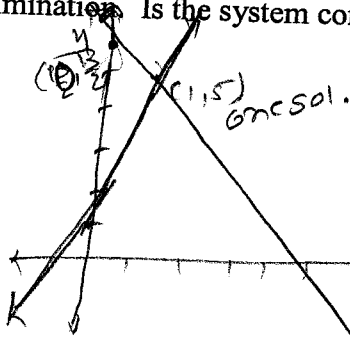
sub  $x=1$   $3(1) + 2y = 13$

Eq. are independent  $3 + 2y = 13$

$2y = 10$

$y = 5$

System is consistent  
one unique solution



b)  $p + q = -5 \Rightarrow p + q = -5$  ①

$-1(-2p + q = 1) \Rightarrow 2p - q = -1$  ②

$3p = -6 \Rightarrow p = -2$

Put  $p = -2$  in  $-2 + q = -5$  (p, q)

$q = -5 + 2$

$q = -3$

unique/one solution

Sol. set  $\{(x, y) | (1, 5)\}$

Sol. set  $\{(p, q) | (-2, -3)\}$

System is consistent

Equations are independent

2. Solve each system by elimination. Is the system consistent, inconsistent or has dependent equations?

a)  $(x + 3y = 4) \cdot 2 \Rightarrow 2x + 6y = 8$  ①

$-2x - 6y = 3 \Rightarrow -2x - 6y = 3$  ②

$0 \neq 11$  not true

No. Solution,

System is inconsistent

because no solution

Sol. set =  $\emptyset$  or empty set or  $\emptyset$

b)  $(2A - B = 3) \cdot 3 \Rightarrow -6A + 3B = 9$  ①

$6A - 3B = 9 \Rightarrow 6A - 3B = 9$  ②

$0 = 0$  is true

2 lines are overlapping have infinitely many sol.

System is consistent

Equations are dependent:

Sol. set  $\{(A, B) | 6A - 3B = 9\}$  (any one sol. for eq.)

3. Suppose a certain brand of laptop has supply and demand functions given by  $p = 25q + 50$  and  $p = 2800 - 30q$ , respectively.

a) If the price  $p$  is \$350, how many units  $q$  are supplied and how many are demanded. Ans.  $q = 50$  P: \$1300

b) What price gives market equilibrium, and how many units are demanded and supplied at this price?

Supply (Comp. avi)

$P = 25q + 50$

$350 = 25q + 50$

$300 = 25q$

$q = 12$  unit

(Comp. avi)

Demand (Buyer)

$P = 2800 - 30q$

$350 = 2800 - 30q$

$350 - 2800 = -30q$

$30q = 2450$

$q = 81.66$  unit

$q = 82$  Buyer

$(P - 25q = 50) - 1 \Rightarrow -P + 25q = -50$

$P + 30q = 2800 \Rightarrow P + 30q = 2800$

$55q = 2750$

$q = 50$

Put  $q = 50$  in

$P = 25(50) = 50$

$P = 1350 = 50$

$P = 50 + 1250$

$P = 1300$