7.2 Two Variable Linear Systems

For linear eqns, we can also use

③ method of Elimination

to solve the system of eqns.

Elimination

① multiply eqns by #'s to make coefficients of x (or y) match but w/ dif. signs

② Add eqns together.

③ Solve for x (or y) in resulting eqn.

④ Back substitute to get value of other variable.

Ex 1 $3x - 2y = 7$

$8x + 4y = 0$

Ex 2 $3y = 4x - 5$

$-8x + 6y = 1$

Ex 3 $2x - y = 9$

$-10x + 5y = -45$

Ex 4 Two planes start from LAX and fly in opposite directions. The second plane starts $\frac{1}{2}$ hour after the first plane, but its speed is 80 km per hr faster. Find the airspeed of each plane if 2 hrs after the first plane departs the planes are 3200 km apart.

Ex 5 A total of $32,000 is invested in two municipal bonds that pay 5.75% and 6.25% simple interest. The investor wants an annual interest income of $1900 from the investments. What amount should be invested in the 5.75% bond?

7.3 Multivariable Linear Systems

Elementary Row Operations

1. Exchange two rows
2. multiply a row by a nonzero constant.
3. Temporarily multiply a row by a nonzero constant, add to another row, replace one of the rows w/ the result.

# of solns of linear system

1. one unique soln
2. ∞ solns
3. no soln

★ (see pics on pg 522)

Ex 1 Solve the system of eqns. (use Gaussian Elimination)

$$x - y + z = 4$$
$$x + 3y - 2z = -3$$
$$3x + 2y + 2z = 6$$

7.3 (cont)

Ex 2 Solve

$$x - 2y + z = 4$$
$$3x - 6y + 3z = 7$$
$$2x + y + 4z = 2$$

Ex 3 Solve

$$x - 2y - z = -5$$
$$2x + y + z = 5$$

7.3 (cont)

Ex 4 Find the eqn of the parabola that passes through (0, 3), (1, 4) and (2, 3).

$y = ax^2 + bx + c$

7.4 Partial Fractions

Decomposing Fraction

(1) If improper fraction, do long division first!

(2) Factor denominator completely, into linear and quadratic factors.

(3) For each linear factor, of form $(mx+b)^n$, partial fraction decomposition must include

$$\frac{A_1}{(mx+b)} + \frac{A_2}{(mx+b)^2} + \frac{A_3}{(mx+b)^3} + \cdots + \frac{A_n}{(mx+b)^n}$$

(4) For each quadratic factor, decomp. must include (of form $(ax^2+bx+c)^k$)

$$\frac{B_1x+C_1}{(ax^2+bx+c)} + \frac{B_2x+C_2}{(ax^2+bx+c)^2} + \cdots + \frac{B_kx+C_k}{(ax^2+bx+c)^k}$$

Ex 1 Write the partial fraction decomposition of

$$\frac{2x^2+7x+4}{(x+1)^3}$$

Ex 2 Write PFD for $\dfrac{-x^3+4x^2-2x+6}{x^2(x^2+2)}$

Ex 3 write PFD for $\dfrac{16x^4}{(2x-1)^3}$

[Note: $(2x-1)^3 = 8x^3+12x^2+6x-1$]

7.4 (cont)

Ex 4 Write PFD for $\dfrac{4x^2-1}{2x(x+1)^2}$