**3.5 – Systems With Three Variables**

You can use elimination and/or substitution to solve a system of three equations in three variables by working with the equations in pairs. (You’ll use one of the equations two times.)

**Solution: (x, y, z)**

-You can have No Solution (no point lies in all three planes)

-You can have One Solution (the planes intersect at one common point)

-You can have Infinitely Many Solutions (planes intersect at all points along a common line)

(page 166 has a great visuals of this concept)

**Example 1: Solving a System Using Elimination**

\*Eliminate the z in equation 1 and 2 then in 2 and 3.

(Gives two equations in just x and y.)

\*Write two new equations as a system and solve for x and y.

**x=3**

\*Solve for z now that you have x and y.

**z=1**

**Solution: (3, 3, 1)**

**Example 2: Solving a System Using Elimination**

**Solution: (1, -4, 3)**

**Example 3: Solving a System Using Substitution**

\*Solve for x in equation 2.

\*Substitute the expression for x into the 1st and 3rd equation and simplify.

\*Write the new equations as a system and solve for y and z.

🡨multiply by 2 and eliminate the z

\*Plug y and z back into an original equation

**Solution: (4, 1, 6)**

You manage a clothing store and have a $6000 budget to restock 200 shirts. You can buy t-shirts for $12, polo shirts for $24 and rugby shirts for $36 each. If you want twice as many rugby shirts as polo shirts, how many of each type of shirt should you buy?

**\*Write the system.**

**You should buy 20 t-shirts, 60 polo shirts and 120 rugby shirts.**

**HMWK: pg 171 #1-5, 9-13 (odd), 21-25 (odd), 30, 33, 49**