Date: ________________

9.2 Systems of Equations

1) Systems of Equations

We already know how to solve a system of equations in R^2 (substitution, elimination, graphing). We can also use a matrix and elementary row operations to solve in both R^2 and R^3 as long as we have an appropriate number of equations (same # of equations as unknowns).

Interpreting an Algebraic Solution Geometrically

Case 1: The solution is $0 = a$, where a is any constant. What does this mean?

Case 2: The solution is $x = a$, $y = a$, or $z = a$, where a is any constant. What does this mean?

Case 3: The solution is $0 = 0$. What does this mean, and what do we need to do in when this occurs?

Vocabulary Note: A system of equations is consistent if it has a solution (one POI or an infinite number of POIs), and it is inconsistent if it does not have a solution (parallel lines or planes).

If you really dislike matrices, you can solve using elementary operations (elimination/substitution). We will do one example this way, but I strongly recommend using matrices!!

Example: Solve the system of equations below using elementary operations.

$$x - y + z = 1$$

$$2x + y - z = 11$$

$$3x + y + 2z = 12$$