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Key Concepts

- A system of linear equations consists of two or more equations made up of two or more variables such that all equations in the system are considered simultaneously.
- The solution to a system of linear equations in two variables is any ordered pair that satisfies each equation independently.
- Systems of equations are classified as independent with one solution, dependent with an infinite number of solutions, or inconsistent with no solution.
- One method of solving a system of linear equations in two variables is by graphing. In this method, we graph the equations on the same set of axes.
- Another method of solving a system of linear equations is by substitution. In this method, we solve for one variable in one equation and substitute the result into the second equation.
- A third method of solving a system of linear equations is by addition, in which we can eliminate a variable by adding opposite coefficients of corresponding variables.
- It is often necessary to multiply one or both equations by a constant to facilitate elimination of a variable when adding the two equations together.
- Either method of solving a system of equations results in a false statement for inconsistent systems because they are made up of parallel lines that never intersect.
- The solution to a system of dependent equations will always be true because both equations describe the same line.
- Systems of equations can be used to solve real-world problems that involve more than one variable, such as those relating to revenue, cost, and profit.

Glossary

addition method an algebraic technique used to solve systems of linear equations in which the equations are added in a way that eliminates one variable, allowing the resulting equation to be solved for the remaining variable; substitution is then used to solve for the first variable

break-even point the point at which a cost function intersects a revenue function; where profit is zero

consistent system a system for which there is a single solution to all equations in the system and it is an independent system, or if there are an infinite number of solutions and it is a dependent system

cost function the function used to calculate the costs of doing business; it usually has two parts, fixed costs and variable costs

dependent system a system of linear equations in which the two equations represent the same line; there are an infinite number of solutions to a dependent system

inconsistent system a system of linear equations with no common solution because they represent parallel lines, which have no point or line in common

independent system a system of linear equations with exactly one solution pair
 $\left(x, y\right)$

profit function the profit function is written as
 $P\left(x\right)=R\left(x\right)-C\left(x\right)$, revenue minus cost

revenue function the function that is used to calculate revenue, simply written as
 $R=xp$, where x is quantity and p is price

substitution method an algebraic technique used to solve systems of linear equations in which one of the two equations is solved for one variable and then substituted into the second equation to solve for the second variable

system of linear equations a set of two or more equations in two or more variables that must be considered simultaneously.

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