Section 3.3 – Systems of Linear Equations in Three Variables

In class work: Complete all statements. Solve all exercises.

1. Give an examples of a system of three linear equations in two variables (3 x 3 linear system).

2. What is a solution of a 3 x 3 linear system?

3. What is the geometric meaning of a solution of a system of three linear equations with three variables (3 x 3 linear system)?

4. How many solutions can a 3 x 3 linear system have?

5. What methods could be used to solve a 3 x 3 linear system?

Exercise 1 Solve each system by the method of your choice (substitution or elimination)"

a) $\begin{cases} 4x-y+2z=11 \\ x+2y-z=-1 \\ 2x+2y-3z=-1 \end{cases}$ b) $\begin{cases} 2x+y-2z=-1 \\ 3x-3y-z=5 \\ x-2y+3z=6 \end{cases}$ c) $\begin{cases} 3x+2y-3z=-2 \\ 2x-5y+2z=-2 \\ 4x-3y+4z=10 \end{cases}$

d) $\begin{cases} 3x+4y+5z=8 \\ x-2y+3z=-6 \\ 2x-4y+6z=8 \end{cases}$ e) $\begin{cases} x+2y+z=4 \\ 3x-4y+z=4 \\ 6x-8y+2z=8 \end{cases}$ f) $\begin{cases} 2x-y+2z=-8 \\ x+2y-3z=9 \\ 3x-y-4z=3 \end{cases}$

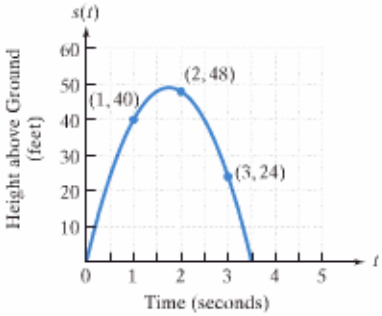
Exercise 2 Find the quadratic (second degree) equation $y=ax^2+bx+c$ whose graph passes through the given points $(-1,6),(1,4),(2,9)$.

Exercise 3 A person invested \$6700 for one year, part at 8%, part at 10%, and the remainder at 12%. The total annual income from these investments was \$716. The amount of money invested at 12% was \$300 more than the amounts invested at 8% and 10% combined. Find the amount invested at each rate.

Exercise 4 At a college production of Streetcar Named Desire, 400 tickets were sold. The ticket prices were \$8, \$10, and \$12, and the total income from ticket sales was #3700. How many tickets of each type were sold if the combined number of \$8 and \$10 tickets sold was 7 times the number of \$12 tickets sold?

Exercise 5 A box contains \$6.25 in nickels, dimes, and quarters. There are 85 coins in all with 3 times as many nickels as dimes. How many of each type were there?

Exercise 6 A ball is thrown straight upward.
The graph shows the ball's height, s(t), in feet, after t seconds.



a) Find the quadratic function $s(t)=at^2+bt+c$ whose graph passes through the three points labeled on the graph. ((1,40), (2,48), and (3,24))

b) Find and interpret $s(3.5)$. Identify your solution as a point on the graph shown.

c) Estimate the domain and range of the function shown in the graph.

d) Estimate the time(s) when the ball is 40 feet high.

Answers

1a) $(2,-1,1)$; 1b) $(1,-1,1)$; 1c) $(1,2,3)$; 1d) no solutions; 1e) infinitely many solutions; f) $(-1,2,-2)$.

2) $y=2x^2-x+3$; 3) \$1200 at 8%, \$2000 at 10%, and \$3500 at 12%; 4) 200 \$8 tickets, 150 \$10 tickets, 50 \$ 12 tickets; 5) 60 nickels, 20 dimes, 5 quarters; 6) $s(t)=-16t^2+56t$