Linear Equations

(1) A triangle has vertices $(1, 2), (3, -4), (-2, 3)$. Find the area of the triangle.

(2) The currents running through an electrical system are given by the following system of equations. The three currents I_1, I_2, I_3 are measured in amps. Solve the system to find the currents in this circuit. (Use elementary row operations to find the inverse matrix.)

$$\begin{array}{rcrcrcl} I_1 & + & 2I_2 & - & I_3 & = & 0.425 \\ 3I_1 & - & I_2 & + & 2I_3 & = & 2.225 \\ 5I_1 & + & I_2 & + & 2I_3 & = & 3.775 \end{array} \tag{1}$$

(3) Find the equation of the parabola $y = ax^2+bx+c$ that passes through the following three points: $(-2, 40), (1, 7), (3, 15)$. (Use the determinant/adjugate method to find the inverse matrix.)

(4) The Arcadium arcade in Lynchburg, Tennessee uses 3 different colored tokens for their game machines. For \$20 you can purchase any of the following mixtures of tokens: 14 gold, 20 silver, and 24 bronze; OR, 20 gold, 15 silver, and 19 bronze; OR, 30 gold, 5 silver, and 13 bronze. What is the monetary value of each token?

(5) In the position function for vertical height

$$s(t) = \frac{1}{2}at^2 + v_0t + s_0 \tag{2}$$

$s(t)$ represents height in meters and t represents time in seconds.

1. Find the position function for a volleyball served at an initial height of one meter, with height of 6.275 meters 0.5 seconds after serve, and height of 9.1 meters one second after serve.
2. How long until the ball hits the ground on the other side of the net if everyone on that team completely misses it?

(6) Last Tuesday, Regal Cinemas sold a total of 8500 movie tickets. Proceeds totaled \$64,600. Tickets can be bought in one of 3 ways: a matinee admission costs \$5, student admission is \$6 all day, and regular admissions are \$8.50. How many of each type of ticket was sold if twice as many student tickets were sold as matinee tickets?