

### 3.6 Linear Systems

$$3x + 6y = 15$$

$$y - z = -1$$

$$-2x - 4y + z = -7$$

$$3x + 6y + 0z = 15$$

$$0x + 1y - 1z = -1$$

$$-2x - 4y + 1z = -7$$

$$\left( \begin{array}{ccc|c} 3 & 6 & 0 & 15 \\ 0 & 1 & -1 & -1 \\ -2 & -4 & 1 & -7 \end{array} \right) \Rightarrow \left( \begin{array}{ccc|c} 1 & 0 & 0 & A \\ 0 & 1 & 0 & B \\ 0 & 0 & 1 & C \end{array} \right)$$

$$x = A$$

$$y = B$$

$$z = C$$

$$\downarrow \frac{1}{3}R_1$$

$$\Rightarrow \left( \begin{array}{ccc|c} 1 & 2 & 0 & 5 \\ 0 & 1 & -1 & -1 \\ -2 & -4 & 1 & -7 \end{array} \right)$$

$$\Downarrow 2R_1 + R_3$$

$$\Rightarrow \left( \begin{array}{ccc|c} 1 & 2 & 0 & 5 \\ 0 & 1 & -1 & -1 \\ 0 & 0 & 1 & 3 \end{array} \right)$$

$$\Downarrow -2R_2 + R_1$$

$$\Rightarrow \left( \begin{array}{ccc|c} 1 & 0 & 2 & 7 \\ 0 & 1 & -1 & -1 \\ 0 & 0 & 1 & 3 \end{array} \right)$$

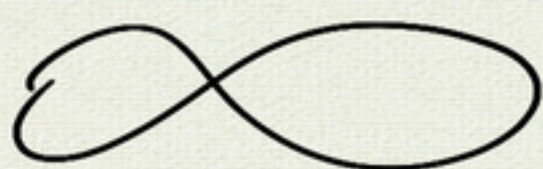
$$\Downarrow \begin{array}{l} -2R_3 + R_1 \\ R_3 + R_2 \end{array}$$

$$\Rightarrow \left( \begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{array} \right)$$

$$x = 1$$

$$y = 2$$

$$z = 3$$



lemniscate

$$r^2 = a^2 \cos 2\theta$$