Planar Transformations

① $A_{(3,-5)}(2,7) =$

② $\begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}\begin{pmatrix} -2 \\ 5 \end{pmatrix} =$

③ $\begin{pmatrix} 3 & 2 \\ -1 & 4 \end{pmatrix}\begin{pmatrix} 0 & -3 \\ 1 & 2 \end{pmatrix} =$

④ $\begin{pmatrix} 2 & -5 \\ -1 & 6 \end{pmatrix}^{-1} =$

Equations in One Variable

Circle the equations below that have no solution.

Ⓐ $x^2 = 4$

Ⓑ $e^{x^2-3} = 0$

Ⓒ $2x - 3 = x + 7$

Ⓓ $\log_e(x)^3 = 2$

Ⓔ $(2x-1)^2 = 5$

Ⓕ $\log_e(x) = -12$

Ⓖ $\sqrt{2^x} = -4$

Ⓗ $\sqrt[3]{2x-7} = -10$

Ⓘ $(3x^2-4)^2 = -1$

Quadratic Equations in $f(x)$

① Solve for x if $\frac{x^2}{2} + 2x - 3 = 0$.

② Solve for y if $\frac{y^2}{2} + 2y - 3 = 0$.

③ Solve for $\log_e(x)$ if $\frac{\log_e(x)^2}{2} + 2\log_e(x) - 3 = 0$.

④ Solve for x if $\frac{\log_e(x)^2}{2} + 2\log_e(x) - 3 = 0$.

Equations in Two Variables

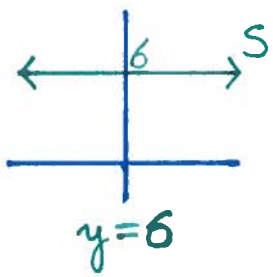
① Write an equation for a line of slope -3 that passes through the origin.

② Write an equation for a line of slope 6 that passes through the point $(3,-5)$.

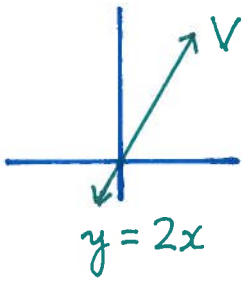
③ Find the slope of the line containing the points $(1,3)$ and $(7,-2)$.

④ Write an equation for the line from problem 3.

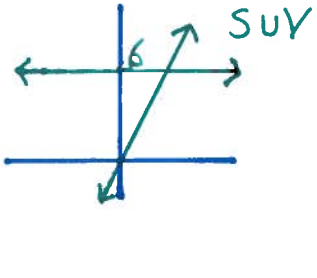
⑤ Write an equation for $S \cup V$ below.



$y=6$

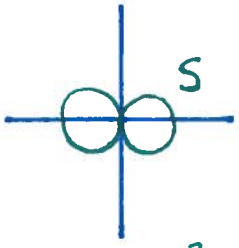


$y=2x$



POTS

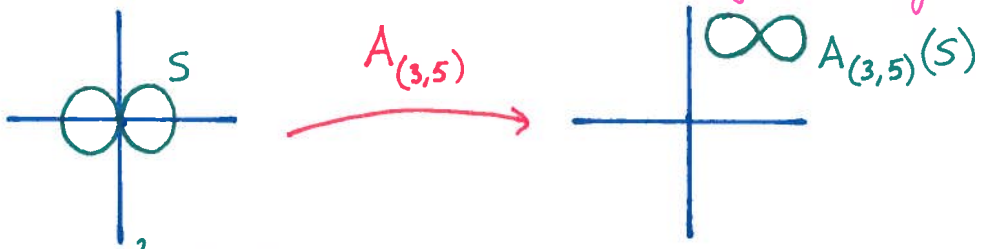
The "Lemiscate of Bernoulli" is the set of solutions, S, of the polynomial equation $[x^2+y^2]^2 = x^2-y^2$.



$[x^2+y^2]^2 = x^2-y^2$

① Write an equation for $A_{(3,5)}(S)$.

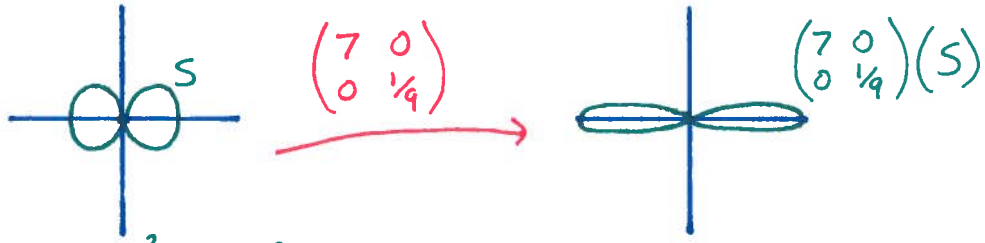
(What's $A_{(3,5)}^{-1}$? What's $[x^2+y^2]^2 = x^2-y^2$ composed with $A_{(3,5)}^{-1}$?)



$[x^2+y^2]^2 = x^2-y^2$

② Write an equation for $\begin{pmatrix} 7 & 0 \\ 0 & 1/9 \end{pmatrix}(S)$.

(What's $\begin{pmatrix} 7 & 0 \\ 0 & 1/9 \end{pmatrix}^{-1}$? What's $[x^2+y^2]^2 = x^2-y^2$ composed with $\begin{pmatrix} 7 & 0 \\ 0 & 1/9 \end{pmatrix}$?)



$[x^2+y^2]^2 = x^2-y^2$