The University of Georgia

Mathematics Education

EMAT 4680/6680 Mathematics with Technology

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Exploration 1

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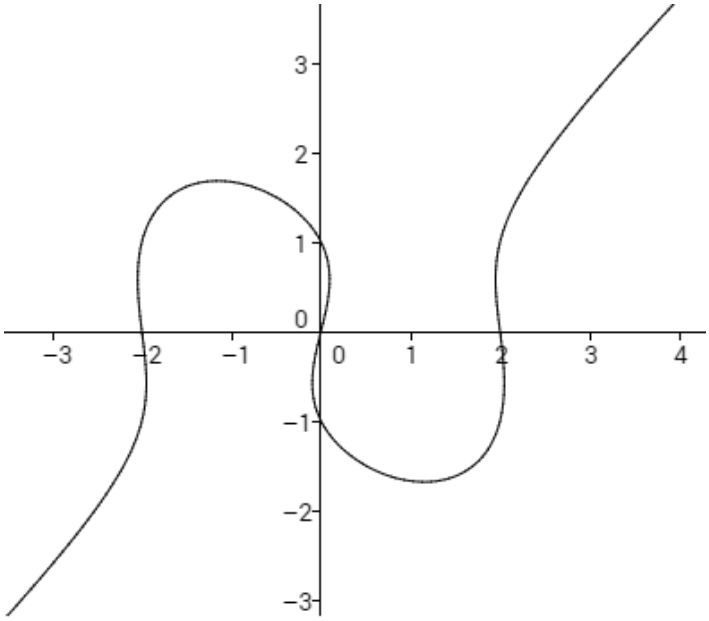
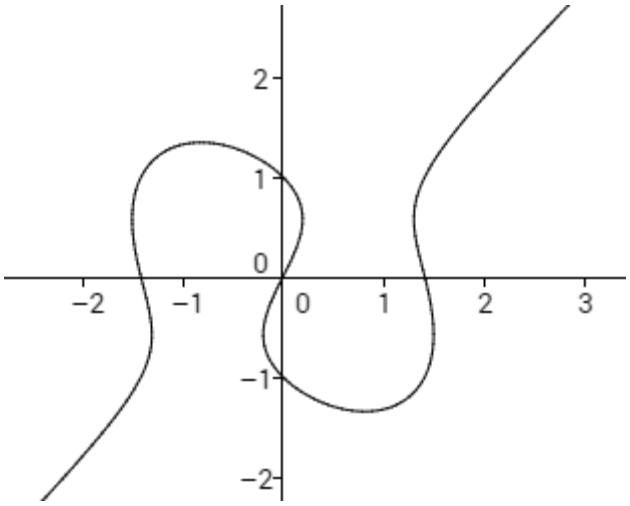
Examine the equation $x(x^2-4)=y(y^2-1)$.



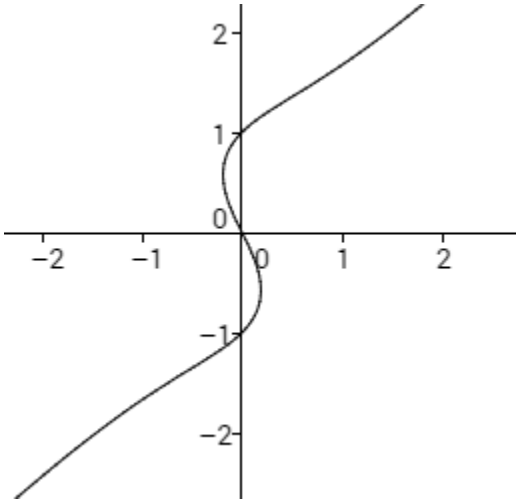
Our graph has three x-intercepts at -2, 0, and 2. Our graph has 2 y intercepts at -1 and 1.

What happens if the 4 is replaced by other numbers?

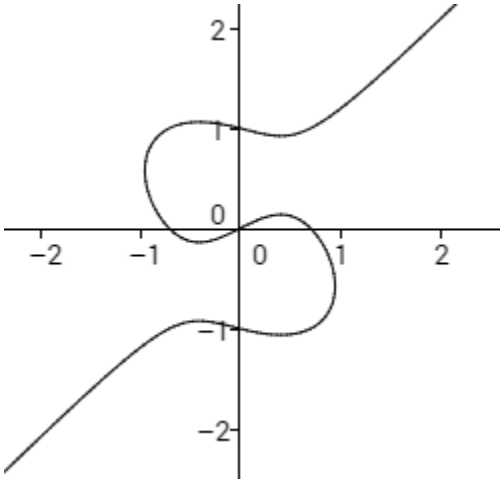
$x(x^2-2)=y(y^2-1)$.



$x(x^2+2)=y(y^2-1)$.



$x(x^2-0.5)=y(y^2-1)$.



We can see several things happening from our changes. We can clearly see that the -1 in the right hand of the equation defines our y intercepts. No matter what we change for the left side of the equation, our graph still has y intercepts at -1 and 1. What is happening as we are changing this value of -4? As our value increases along the x-axis from 0, our graph increases towards infinity. As our value decreases along the x-axis from 0, our graph decreases towards infinity. The closer our value is to 0, the more shrinked into a double horse shoe shape it will be. As our value moves further away from zero, our graph becomes more stretched. Essentially the graph displays opposite behaviors at each end.

What happens when we change the value to 1? We obtain the line y=x and an ellipse that intersects the y and x axis at 1 and -1.