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9-3 Classifying Conic Sections

$$Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$$

if $A=0$ or $C=0 \rightarrow$ parabola
 if $A=C \rightarrow$ circle
 if A and C have the same sign \rightarrow ellipse
 if A and C have different signs \rightarrow hyperbola

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Ex 1 Classify the graph of each equation

a. $x^2 - 3y^2 - 4x + 1 = 0$
 Hyperbola

b. $x^2 + y^2 - 10x + 2y + 22 = 0$
 Circle

c. $x^2 - 4x - 24y - 4 = 0$
 parabola

d. $2x^2 + 3y^2 - 28x - 12y + 104 = 0$
 ellipse

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Ex 2 Classify the conic, rewrite in standard form, graph, and find all of the characteristics.

$9x^2 + 5y^2 + 36x - 30y + 36 = 0$ - ellipse

$$9(x^2 + 4x + 4) + 5(y^2 - 6y + 9) = -36 + 36 + 45$$

$$\frac{9(x+2)^2}{45} + \frac{5(y-3)^2}{45} = \frac{45}{45}$$

$$\frac{(x+2)^2}{5} + \frac{(y-3)^2}{9} = 1$$

$c^2 = a^2 - b^2$
 $c^2 = 9 - 5$
 $c = 2$

Center $(-2, 3)$
 Foci $(-2, 1)$ and $(-2, 5)$

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What if we have an xy term?

Rotates the axis

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Homework
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