Practice Second Midterm Exam

Conics

For #1-12, match the numbered quadratic equations in two variables with their lettered sets of solutions. Worth $\frac{1}{2}$ point each.

1.) $y = x^2$

2.) $x^2 - y^2 = 0$

3.) $x^2 = 0$

4.) $xy = 1$

5.) $x^2 + y^2 = 0$

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

7.) $x^2 = -1$

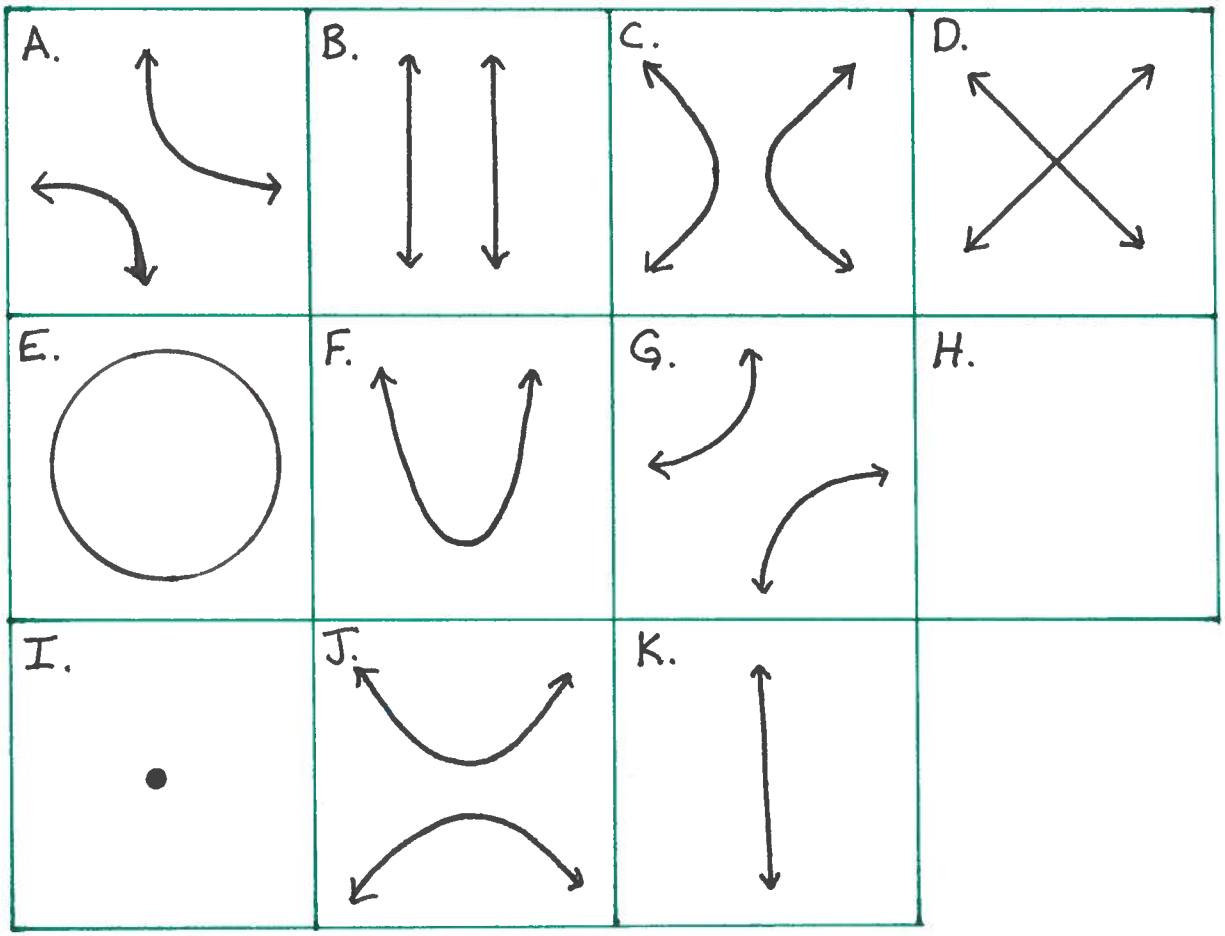
8.) $x^2 = 1$

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

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

11.) $xy = -1$

12.) $x^2 + y^2 = 1$



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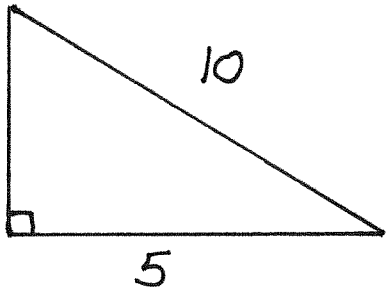
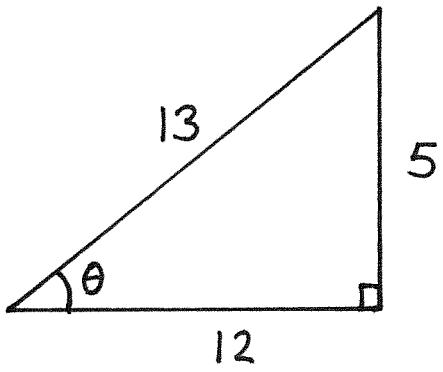
Trigonometry

13.) What is the distance between the points $(4, -1)$ and $(-3, 5)$?

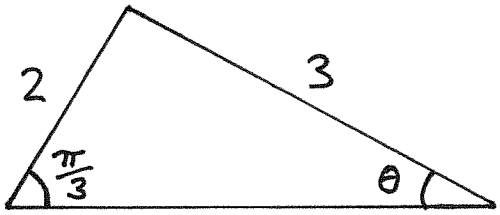
14.) Find the length of the unlabled side of the triangle below.



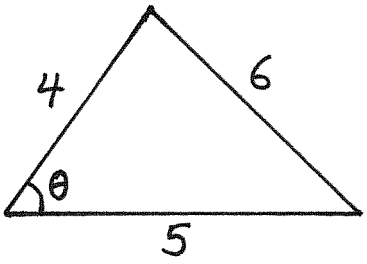
15.) Find $\sin(\theta)$, $\cos(\theta)$, and $\tan(\theta)$ for the angle θ given below. (3 points.)



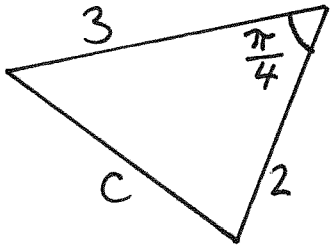
16.) Find $\sin(\theta)$ for the angle θ given below.



17.) Find $\cos(\theta)$ for the angle θ given below.



18.) Find the length c shown below.



19.) Write the vector $(-2, 5)$ in polar coordinates.

20.) Rotate the point $2\big(\cos(4), \sin(4)\big)$ counterclockwise by an angle of 5.

21.) Write the matrix that rotates the plane clockwise by an angle of $\frac{2\pi}{3}$. Simplify your answer so that it does not contain the letters sin or cos.

22.) Use your answer from #21 to rotate the vector $(2, 4)$ clockwise by an angle of $\frac{2\pi}{3}$. Write your answer as a row vector.

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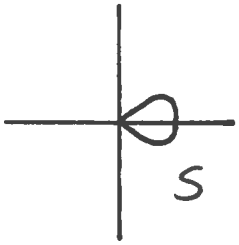
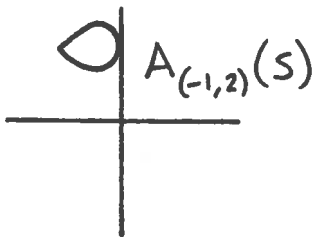
Transformations of Solutions of Equations in Two Variables

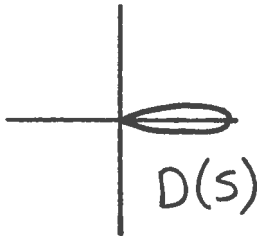
The "Pear Shaped Quartic" is the set of solutions, S, of the polynomial equation $x^4 - x^3 + y^2 = 0$.



23.) Give an equation for $A_{(-1,2)}(S)$, the Pear Shaped Quartic shifted left 1 and up 2.



24.) Let $D = \begin{pmatrix} 2 & 0 \\ 0 & \frac{1}{3} \end{pmatrix}$. Give an equation for $D(S)$, the Pear Shaped Quartic scaled by 2 in the x-coordinate and $\frac{1}{3}$ in the y-coordinate.



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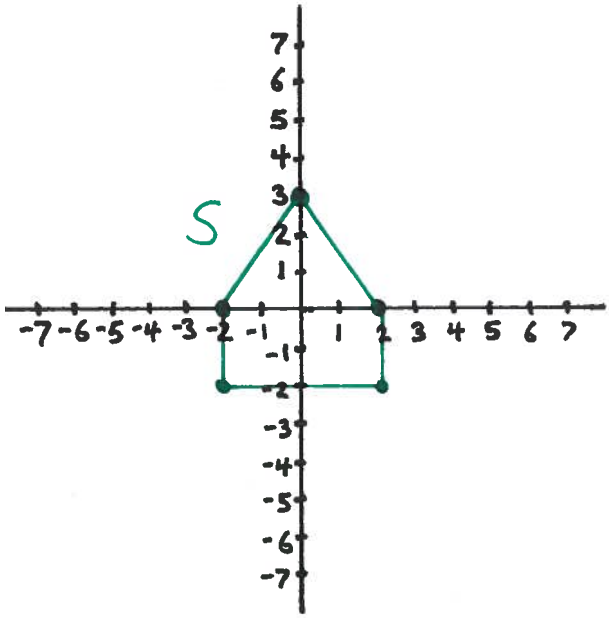
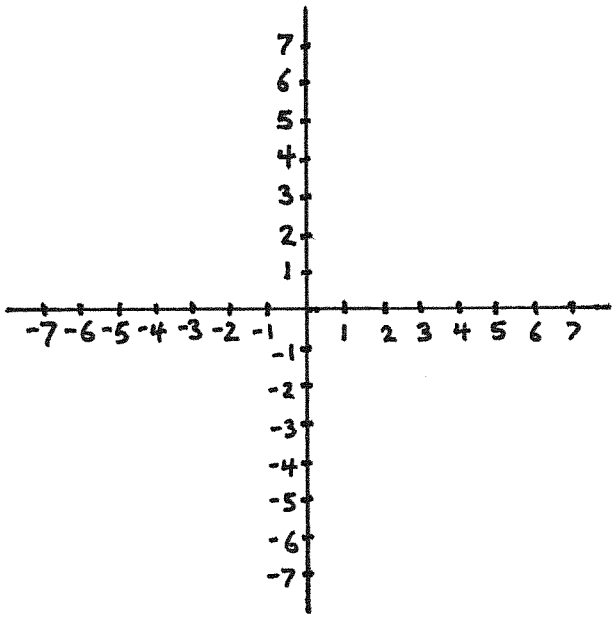
Planar Transformations

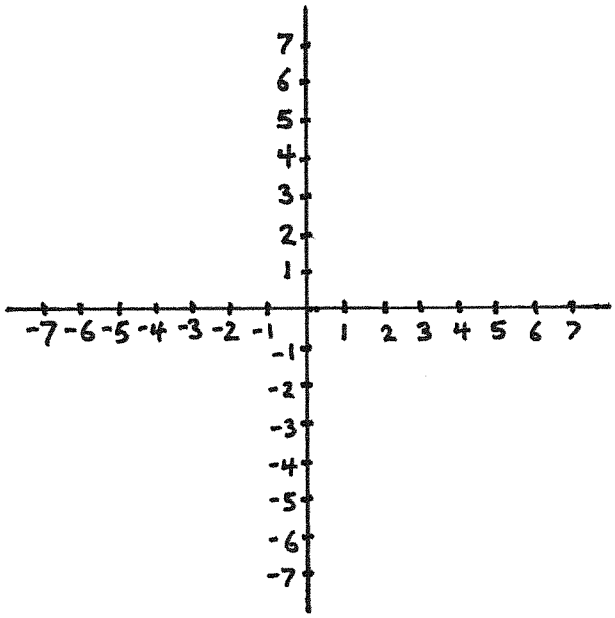
Shown below is a set S in the plane. (The x- and y-axes are not part of S. They are just drawn for perspective.)



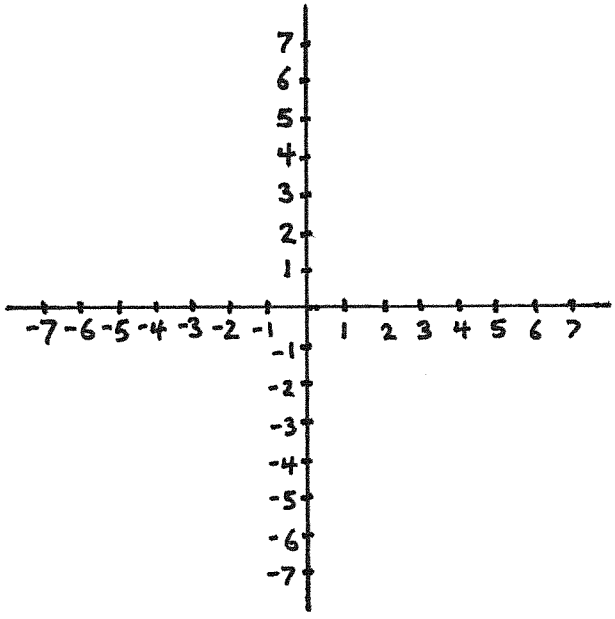
25.) Draw $A_{(2,-3)}(S)$



26.) Draw $\begin{pmatrix} 3 & 0 \\ 0 & \frac{1}{2} \end{pmatrix}(S)$



27.) Draw $R_{\frac{-\pi}{4}}(S)$



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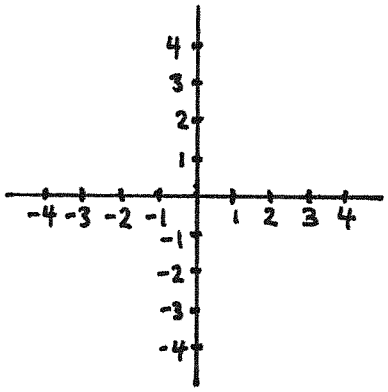
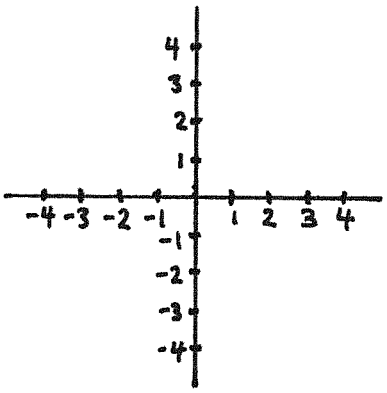
Conics

For #28-30, Draw the set of solutions of the given equation in two variables. (Label at least one point precisely in #28.)

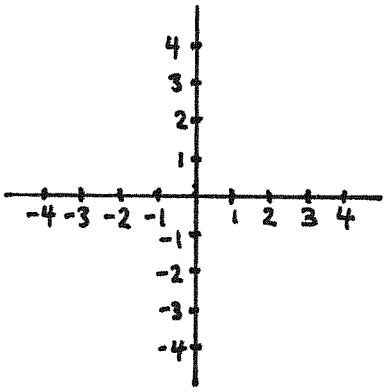
28.) $xy = 2$



29.) $x^2 + y^2 = 9$



30.) $\frac{x^2}{4} + 4y^2 = 1$



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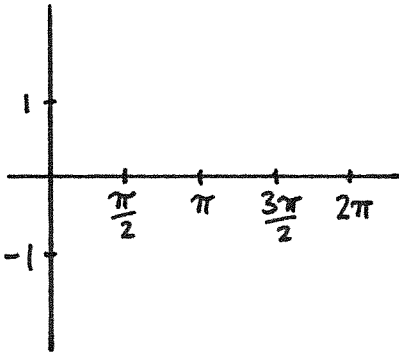
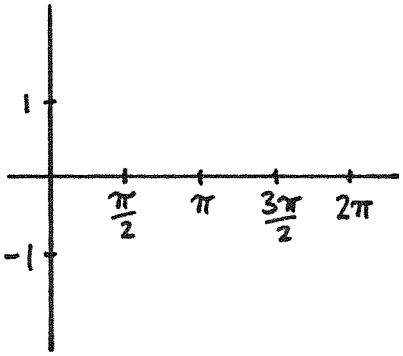
Trigonometric Functions

For #31-36, draw the graphs of the given functions.

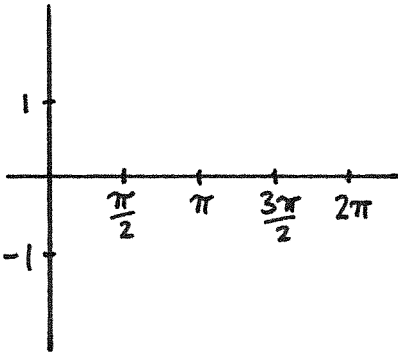
31.) $\sin(\theta)$



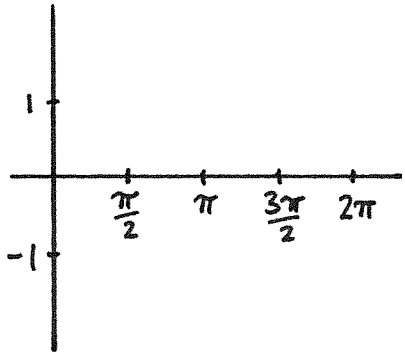
32.) $\cos(\theta)$



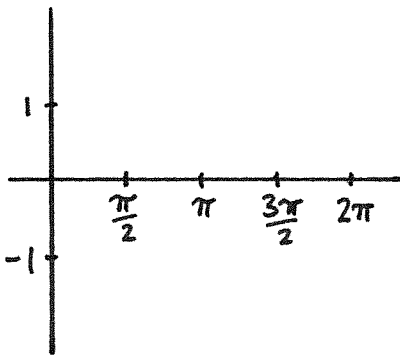
33.) $\tan(\theta)$



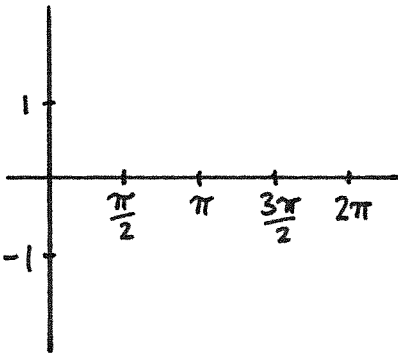
34.) $\csc(\theta)$



35.) $\sec(\theta)$



36.) $\cot(\theta)$



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Equations in One Variable

The remaining questions are each worth 2 points. For #37-42, find the solutions of the given equations, and show your work. If an equation has no solution, explain why.

37.) $\log_3(x-7) = 4$

38.) $(2x-5)^2 = 16$

39.) $\sqrt{3x^2-2} = -3$

40.) $\log_e(x) + \log_e(x+1) = \log_e(6)$

41.) $(e^x)^2 e^{x+4} = 5$

42.) $\frac{\frac{x}{x+1}+x}{x-2} = 1$

First Name:_____ Last Name:_____

1.) _____

2.) _____

3.) _____

4.) _____

5.) _____

6.) _____

7.) _____

8.) _____

9.) _____

10.) _____

11.) _____

12.) _____

13.) _____

14.) _____

15.) $\sin(\theta) =$ _____

$\cos(\theta) =$ _____

$\tan(\theta) =$ _____

16.) _____

17.) _____

18.) _____

19.) _____

20.) _____

21.) _____

22.) _____