Practice First Midterm Exam

Conics

For #1-8, match the numbered quadratic equations in two variables with their lettered sets of solutions.

1.) $x^2 = -1$

2.) $x^2 = 0$

3.) $x^2 = 1$

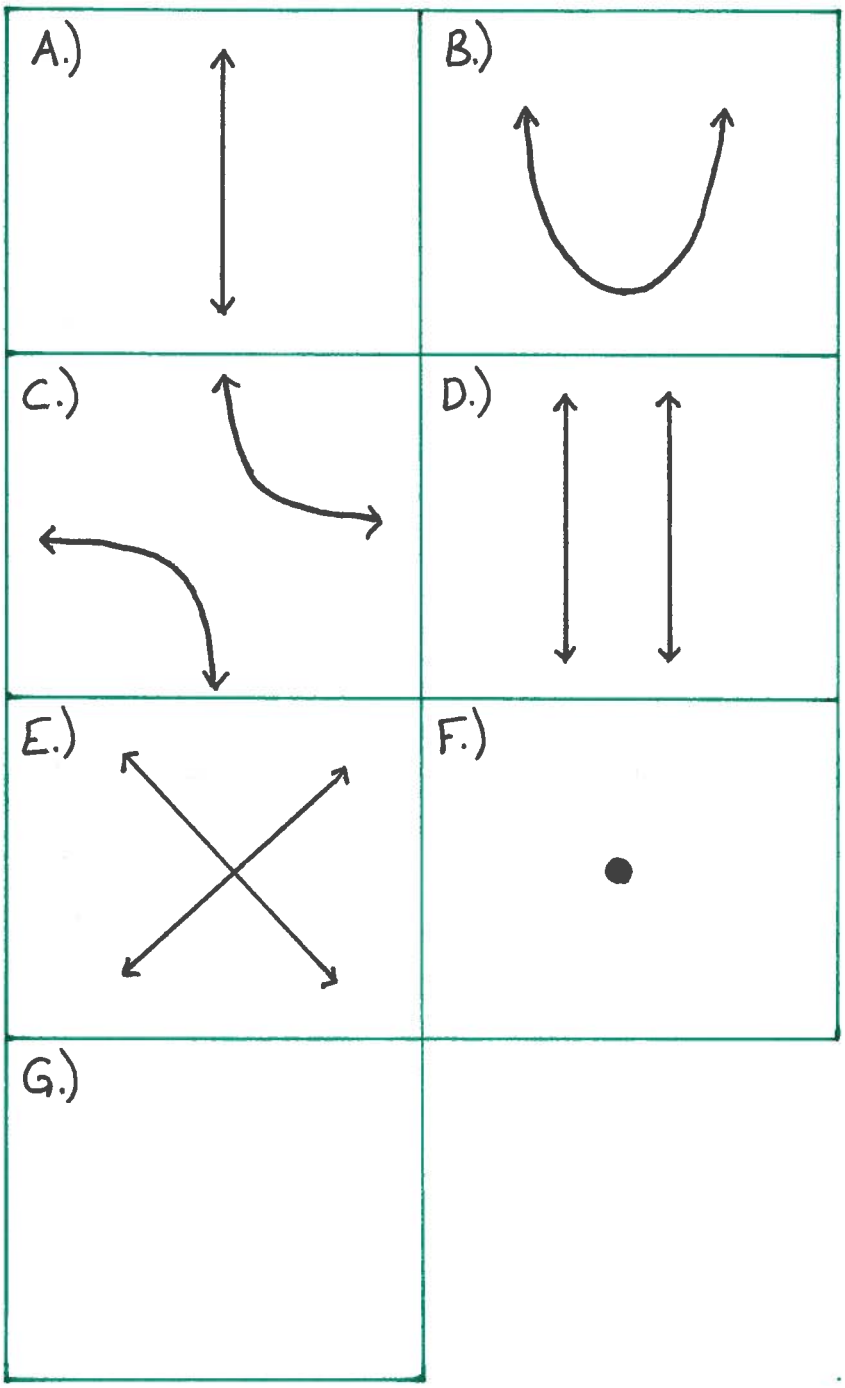
4.) $xy = 1$

5.) $y = x^2$

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

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

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



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Linear algebra

For #9-15, give the vector, written as a **ROW** vector.

9.) $A_{(-2,4)}(3,-5)$

10.) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} -1 \\ 8 \end{pmatrix}$

11.) $\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

12.) $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} -5 \\ -2 \end{pmatrix}$

13.) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 3 \\ 4 \end{pmatrix}$

14.) $\begin{pmatrix} 3 & 0 \\ 0 & 2 \end{pmatrix} \begin{pmatrix} -1 \\ 6 \end{pmatrix}$

15.) $\begin{pmatrix} 2 & -4 \\ -3 & 6 \end{pmatrix} \begin{pmatrix} 3 \\ -2 \end{pmatrix}$

16.) Find the product $\begin{pmatrix} -2 & 4 \\ 1 & 3 \end{pmatrix} \begin{pmatrix} -5 & 1 \\ -2 & 3 \end{pmatrix}$

17.) Give the determinant of $\begin{pmatrix} 2 & 8 \\ 7 & 3 \end{pmatrix}$

18.) Give the inverse of $\begin{pmatrix} 3 & 8 \\ -9 & -20 \end{pmatrix}$

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Lines

19.) Give an equation for a line in the plane that has slope -6 and passes through the point $(0, 0)$.

20.) Give an equation for a line in the plane that has slope 3 and passes through the point $(4, 8)$.

21.) Give the slope of the line that passes through the points $(2, -4)$ and $(-3, 2)$.

22.) Give an equation for the line that passes through the points $(2, -4)$ and $(-3, 2)$.

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Equations in One Variable

23.) Give the implied domain of the equation $48x^2 + 3x + \sqrt{x} = e^x + 7$.

For #24-26, find the solutions of the given equations, and explain your answers. #24-26 are worth 2 points each.

24.) $(e^x)^2 + 2e^x - 3 = 0$

25.) $x \log_e(3x - 2) = x$ where $x > \frac{2}{3}$

26.) $\sqrt{3x + 2} = -1$

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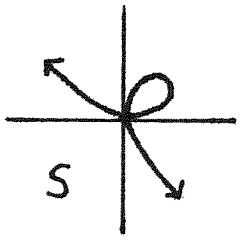
Equations in two variables and their solutions

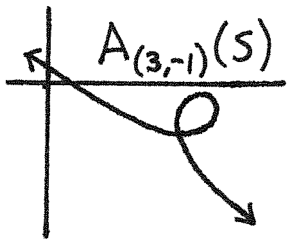
27.) Suppose $p(x, y) = 2xy - 5y^2 - x + 11$. Find $p \circ A_{(2,-3)}(x, y)$. (You don't have to simplify your answer.)

#28-30 are worth 2 points each.

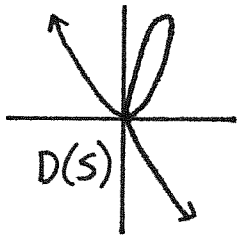
The "Folium of Descartes" is the set of solutions, S, of the polynomial equation $x^3 + y^3 = xy$.



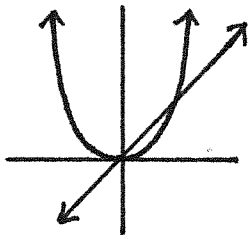
28.) Give an equation for $A_{(3,-1)}(S)$, the Folium of Descartes shifted right 3 and down 1. (You don't have to simplify your answer.)



29.) Let $D = \begin{pmatrix} \frac{1}{2} & 0 \\ 0 & 4 \end{pmatrix}$. Give an equation for $D(S)$, the Folium of Descartes scaled by $\frac{1}{2}$ in the x-coordinate and 4 in the y-coordinate. (You don't have to simplify your answer.)



30.) Give an equation whose set of solutions is the union of the parabola $y = x^2$ and the line $x = y$. (You don't have to simplify your answer.)



First Name:_____ Last Name:_____

1.) _____ 14.) _____

2.) _____ 15.) _____

3.) _____

4.) _____ 16.) _____

5.) _____ 17.) _____

6.) _____

7.) _____ 18.) _____

8.) _____ 19.) _____

9.) _____ 20.) _____

10.) _____ 21.) _____

11.) _____ 22.) _____

12.) _____ 23.) _____

13.) _____