

Name: _____
Period: _____

Date: _____
Pre-Calculus: *Final Exam Review*

I. Solving Triangles

1. Find all of the missing side lengths and angle measures for the following triangles:

- | | | | |
|----|---|----|--|
| a. | $A = 33^\circ; B = 72^\circ; a = 4.2 \text{ in}$ | b. | $A = 35.2^\circ; B = 67.5^\circ; c = 12 \text{ cm}$ |
| c. | $A = 50^\circ; a = 12 \text{ in}; b = 42 \text{ in}$ | d. | $A = 49^\circ; a = 6.8 \text{ ft}; b = 7.9 \text{ ft}$ |
| e. | $C = 120^\circ; a = 10 \text{ cm}; c = 25 \text{ cm}$ | f. | $a = 4 \text{ km}; b = 11 \text{ km}; c = 12 \text{ km}$ |

II. Combinatorics

- In a survey of 50 people, 13 liked football and 21 liked baseball. Ten liked both. How many liked neither?
- In how many ways can a president, vice president, and secretary be chosen from a group of 17 people?
- If you have three shirts, five skirts, and two pairs of shoes, how many outfits can you make?
- How many license plates can be made with three letters and three digits, assuming repeats are allowed?
- In how many ways can five people line up?
- Find the third term in the expansion $(3x - 2y)^9$.
- Complete the first 8 rows of Pascal's Triangle.

III. Probability

- A coin is flipped and a die is tossed. List the sample space.
- An honest coin is flipped three times.
 - List the sample space.
 - What is the probability of getting 1 head and 2 tails?
 - What are the odds of getting 2 heads and 1 tail?
- A card is drawn at random from a standard deck of 52 cards.
 - Find the probability that the card is a club.
 - Find the odds of drawing a red.
 - Find the odds of not drawing a black ace.
 - Find the probability that it is a jack, queen, or king of hearts.
- A coin is flipped successively 4 times. Find the probability of getting exactly 1 head.
- A die is tossed 6 times. What is the probability of rolling exactly 4 "2"s?
- A box contains 4 red and 4 green marbles.
 - If a marble is drawn and replaced 3 times successively, what is the probability that 2 green marbles are drawn?
 - If a marble is drawn 3 times without replacement, what is the probability that 3 red marbles are drawn?

IV. Matrices

$$A = \begin{bmatrix} 5 & 2 & 0 \\ -2 & 1 & -3 \end{bmatrix} \quad B = \begin{bmatrix} -1 & 6 & 2 \\ 0 & -3 & 4 \end{bmatrix} \quad C = \begin{bmatrix} 3 & -2 \\ 6 & 1 \end{bmatrix} \quad D = \begin{bmatrix} 2 & -1 & 0 \\ 4 & 3 & 1 \\ 5 & -2 & 5 \end{bmatrix} \quad E = \begin{bmatrix} 4 & 2 & -3 \\ 1 & 0 & -2 \\ -5 & 3 & 1 \end{bmatrix}$$

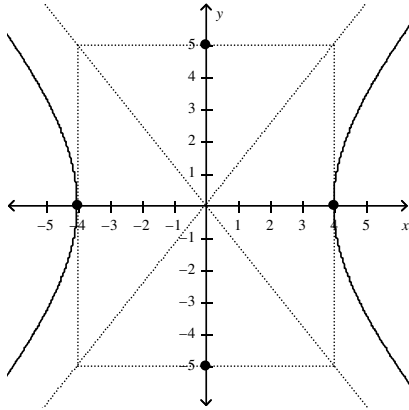
15. Find $A + B$
16. Find $A^T B$
17. Find $6B - \frac{1}{2}A$
18. Find C^{-1}
19. Find CC^{-1}
20. Find $|D|$
21. Find DE
22. Use Cramer's Rule to solve the following systems of equations
 - a.
$$\begin{aligned} 4x + 3y &= 8 \\ 5x - 2y &= 6 \end{aligned}$$
 - b.
$$\begin{aligned} x - 7y &= 10 \\ 3x + 5y &= 14 \end{aligned}$$
 - c.
$$\begin{aligned} -2x + 3y &= 4 \\ 4x - 6y &= 10 \end{aligned}$$

V. Conics

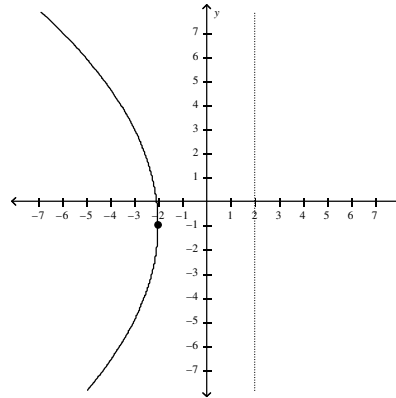
23. Graph each of the following equations. Be sure to include the following:
 1. Label and state the coordinates of the vertex and focus.
 2. Plot the endpoints of the focal width.
 3. Show and state the equation for the directrix.
 - a. $(x + 2)^2 = -8(y + 3)$
 - b. $(y - 1)^2 = 16x$
 - c. $x^2 = 4(y - 4)$
 - d. $(y + 6)^2 = -12(x - 1)$
24. Graph each of the following equations. Be sure to include the following:
 1. State the center.
 2. Give the coordinates of vertices and covertices.
 3. State the length of the major and minor axes.
 4. Give the coordinates of the foci.
 - a. $\frac{(y + 2)^2}{49} + \frac{(x + 3)^2}{64} = 1$
 - b. $\frac{x^2}{16} + \frac{(y - 1)^2}{25} = 1$
25. Graph each of the following equations. Be sure to include the following:
 1. State the center.
 2. Give the coordinates of the vertices.
 3. State the length of the conjugate and transverse axes.
 4. Give the equations for the asymptotes.
 - a. $\frac{(y - 2)^2}{16} - \frac{(x + 1)^2}{25} = 1$
 - b. $\frac{(x + 3)^2}{9} - \frac{y^2}{64} = 1$
26. Given the following information, write the equation for the conic.
 - a. Parabola with focus at (3,2) and directrix at $y = -4$.
 - b. Parabola with vertex at (-3, -1) and directrix at $x = 4$.
 - c. Ellipse with foci at (-5,2) and (5,2) and the major axis is 20.
 - d. Ellipse with horizontal minor axis is 16, major axis is 18, and center is at (-3, 0).
 - e. Circle with (-10, 3) and (-2,7) as endpoints of the diameter.
 - f. Hyperbola with (-5,0) and (5,0) as vertices and foci (-7,0) and (7,0).

27. State the equation for each of the graphs below.

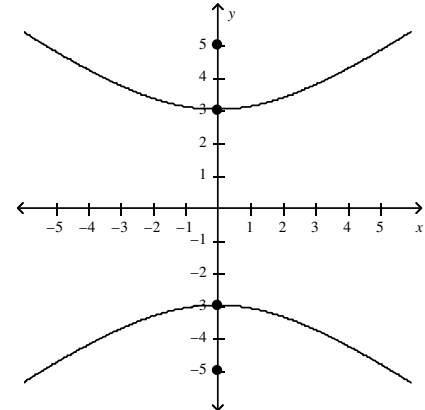
a.



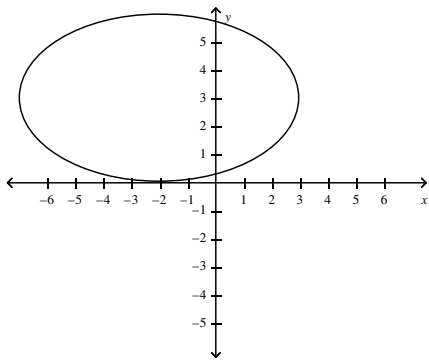
b.



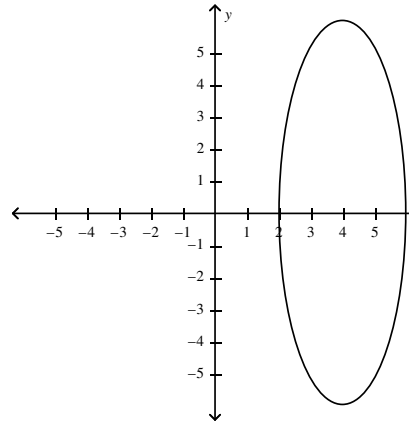
c.



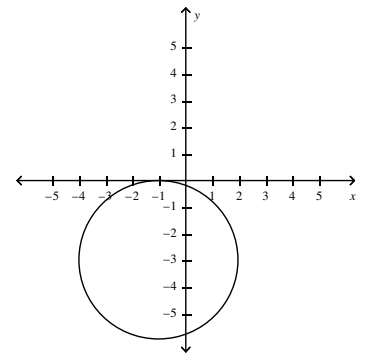
d.



e.



f.



VI. Parametrics

NO CALCULATOR

28. Find two sets of parametric equations for the rectangular equation $y = x^2 - 8$ using the parameters $t = x$ and $t = 1 - x$.

$$\begin{cases} x = \\ y = \end{cases} \quad \text{and} \quad \begin{cases} x = \\ y = \end{cases}$$

29. Sketch the graph represented by the parametric equations $x = 2t - 2$, $y = t^2 - 3$ for $-2 \leq t \leq 2$. Be sure to show the correct orientation.

30. Now eliminate the parameter from question 2 and write the corresponding rectangular equation whose graph represents the curve.

31. Write one equation for each set of parametric equations in terms of only x and y .
$$\begin{cases} x = 2t - 5 \\ y = t + 2 \end{cases}$$

32. Draw a graph to represent each set of parametric equations. Be sure to show the direction.
$$\begin{cases} x = \sqrt{t} \\ y = t + 2 \end{cases} \quad 0 \leq t \leq 16$$

33. Find two different sets of parametric equations for the rectangular equation.

$$x = y^{\frac{5}{4}} \quad \begin{cases} x = \\ y = \end{cases} \quad \text{and} \quad \begin{cases} x = \\ y = \end{cases}$$

34. Sketch the curve represented by the parametric equations (indicate the direction of the curve.) Then eliminate the parameter and write the corresponding rectangular (x and y only) equation whose graph represents the curve.

$$\begin{cases} x = |t - 2| \\ y = t + 3 \end{cases} \quad -2 \leq t \leq 4$$

35. Eliminate the Parameter:

a)
$$\begin{cases} x = 3 \cos t \\ y = 2 \sin t \end{cases}$$

b)
$$\begin{cases} x = 3 \sec t \\ y = 4 \tan t \end{cases}$$

c)
$$\begin{cases} x = 2 \sin t \\ y = 2 \cos t \end{cases}$$

36. Write a set of Parametric Equations for the following:

a)
$$(x - 3)^2 + (y + 4)^2 = 25$$

b)
$$\frac{(y - 3)^2}{16} - \frac{(x + 1)^2}{25} = 1$$

Parametric Review CALC. Permitted Show all work and simplify all answers completely.

37. Suppose a bird flies into the air with a horizontal speed of 4.3 mph and a vertical speed of 1.1 mph.

- Write equations for and draw a graph of the motion of the bird.
- Find the height of the bird after 3 hours.
- Find the bird's location after 45 minutes. Does this answer make sense? Explain.

38. Consider the parametric equations
$$\begin{cases} x = \sqrt{t} \\ y = 5 - t \end{cases}$$
.

a. Complete the table

T	0	1	4	9	16
X					
Y					

- Plot the points (x,y) generated by the table and sketch the graph of the parametric equations.
- Using a graphing calculator, graph the curve represented by the parametric equations.
- Find the rectangular (x and y) equation by eliminating the parameter. Sketch its graph. How does the graph differ from those in parts b and c?

VII. Limits

39.
$$\lim_{n \rightarrow \infty} \frac{(n^2 - 1)}{n^2}$$

40.
$$\lim_{n \rightarrow \infty} \frac{(n - 1)}{n^2}$$

41.
$$\lim_{n \rightarrow \infty} \frac{(n^2 - 1)}{n}$$

42.
$$\lim_{n \rightarrow \infty} .9^n$$

43.
$$\lim_{x \rightarrow -4} -5x + 6$$

44.
$$\lim_{x \rightarrow 2} \frac{x - 2}{x^2 - 4}$$

45.
$$\lim_{x \rightarrow 0} \frac{2 - \sqrt{4 - x}}{x}$$

46.
$$\lim_{x \rightarrow \frac{1}{2}} \frac{2x^2}{2x + 1}$$