Name:_____
Hour:_____

2018 FINAL EXAM REVIEW

PRE-CALCULUS

Please keep in mind that this exam is worth 20% of your overall grade for this SEMESTER and your semester grade is averaged into your overall GPA.

SCHEDULE OF ASSIGNMENTS		
Assignment	Due Date	☑
Chapter 7 – Trig #1-27	Thursday, May 17th	
Chapter 8 – Polar #1-14	Friday, May 18th	
Chapter 8 – Polar #15-28	Tuesday, May 22nd	
Chapter 9 – Matrices #1-20	Wednesday, May 23rd	
Chapter 10 – Conics #1-19	Thursday, May 24th	
Chapter 11 – Sequences & Series #1-20	Friday, May 25th	

7th Hour Exam: Tuesday, May 29th, 9:40-11:10

Chapter 7 – Analytic Trigonometry

Simplify the expression. ***(Section 7.1-7.3 – NON-CALCULATOR)***

1. $\frac{\cot\theta}{\csc\theta-\sin\theta}$

2. $\frac{\cos u\sec u}{\tan u}$

3. $\sin B+\cos B\cot B$

4. $\sin^2\alpha+\cos^2\alpha+\tan^2\alpha$

5. $\sin\theta\,(\cot\theta+\tan\theta)$

6. $\frac{\sin 2x}{1+\cos 2x}$

Verify the identity. ***(Section 7.1-7.3 – NON-CALCULATOR)***

7. $\frac{\sin x}{\tan x}+\frac{\cos x}{\cot x}=\sin x+\cos x$

8. $\frac{\cos x}{1-\sin x}+\frac{1-\sin x}{\cos x}=2\sec x$

9. $\frac{\cos^2 x-\sin^2 x}{1-\tan^2 x}=\cos^2 x$

10. $\frac{\tan^2 x}{\sec x}=\sec x-\cos x$

Use an identity to find the EXACT value of the expression. ***(Section 7.2-7.3 – NON-CALCULATOR)***

11. $\sin 15°$

12. $\sin 67.5°$

13. $\tan \frac{7\pi}{12}$

14. $\tan 22.5°$

15. $\cos 195°$

Use a double angle identity to find $sin\,2x$, $cos\,2x$, and $tan\,2x$ from the given information. ***(Section 7.3 – NON-CALCULATOR)***

16. $\cos x = \frac{4}{5}$; $\csc x < 0$

17. $\csc x = 4$; x in quadrant II

Use the appropriate trigonometric identity to simplify the expression. ***(Sections7.2 & 7.3 – NON-CALCULATOR)***

18. $2\sin 36° \cos 36°$

19. $\sin 18° \cos 27° + \cos 18° \sin 27°$

20. $\sqrt{\frac{1-\cos 35°}{2}}$

Find all solutions of the equation in the interval $[0, 2\pi)$***. Answers must be in radians.*** ***(Section 7.5 – NON-CALCULATOR)***

21. $\sqrt{2}\cos x - 1 = 0$

22. $3\csc^2 x - 4 = 0$

23. $\cos x \sin x - 2\cos x = 0$

24. $\tan^2 x \cos x - \tan^2 x = 0$

25. $2\cos^2 x + \sin x = 1$

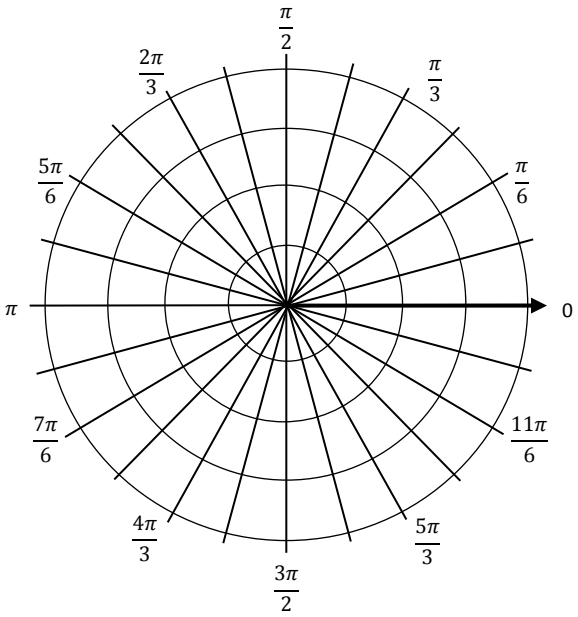
26. $2\cos 2x + 1 = 0$

Chapter 8 – Polar Coordinates & Vectors

Graph each point and label accordingly. Then convert the coordinate to rectangular coordinates. (Section 8.1 – NON-CALCULATOR)

1. $\left(1, \frac{5\pi}{4}\right)$

2. $\left(3, -\frac{2\pi}{3}\right)$



3. $\left(-2, \frac{7\pi}{6}\right)$

4. $\left(-4, -\frac{7\pi}{2}\right)$

A point P(r, θ) is given in polar coordinates. Give <u>two</u> other polar representations of the point, one with r < 0 and one with r > 0. (Section 8.1 – NON-CALCULATOR)

5. $\left(5, \frac{5\pi}{4}\right)$

6. $(-3, 6\pi)$

Convert the rectangular coordinates to polar coordinates with r > 0 and $0 \leq \theta \leq 2\pi$. (Section 8.1 – NON-CALCULATOR)

7. $\left(-3, 3\sqrt{3}\right)$

8. $\left(-\sqrt{2}, -\sqrt{2}\right)$

Express the complex number in polar form. ***(Section 8.3 – NON-CALCULATOR)***

9. $-1+i$ **10.** $-7i$ **11.** $1-i\sqrt{3}$

Find the product z_1z_2 ***and the quotient*** $\frac{z_1}{z_2}$***. Express your answer in*** $a+bi$ ***form.*** ***(Section 8.3 – NON-CALCULATOR)***

12. $z_1 = 7\ cis\ \frac{\pi}{2};\ \ z_2 = 2\ cis\ \frac{2\pi}{3}$

Find the indicated power using DeMoivre's Theorem. Write your answer in complex number form. ***(Section 8.3 – NON-CALCULATOR)***

13. $\left(2\sqrt{3}+2i\right)^5$ **14.** $\left(-\sqrt{3}-i\right)^4$

Express the vector with initial point P and terminal point Q in component form. ***(Section 8.4 – NON-CALCULATOR)***

15. $P(1,1); Q(9,9)$

16. $P(-1,3); Q(-6,-1)$

Find $\mathbf{u}$ ***+*** $\mathbf{v}$***, -3***$\mathbf{u}$ ***+ 5***$\mathbf{v}$***,*** $|\mathbf{v}|$ ***(magnitude!), and*** $|\mathbf{u} - \mathbf{v}|$***.*** ***(Section 8.4 – NON-CALCULATOR)***

17. $\mathbf{u} = \langle -2,5 \rangle,\ \mathbf{v} = \langle 2,-8 \rangle$

18. $\mathbf{u} = -2\mathbf{i} + 3\mathbf{j}, \mathbf{v} = \mathbf{i} - 2\mathbf{j}$

Find the vector in component form having the given magnitude and direction. ***(Section 8.4 – NON-CALCULATOR)***

19. $|\mathbf{v}| = 50,\ \theta = 120°$

20. $|\mathbf{v}| = 6,\ \theta = 310°$

Find the magnitude and direction (in degrees) of the vector. ***(Section 8.4 – NON-CALCULATOR)***

21. $\mathbf{v} = \mathbf{i} + \mathbf{j}$

22. $\langle -2, -2\sqrt{3} \rangle$

Find (a) $\mathbf{u} \cdot \mathbf{v}$ (dot product) (Section 8.5 – NON-CALCULATOR) and (b) the angle between $\mathbf{u}$ and $\mathbf{v}$ to the nearest tenth of a degree (Section 8.5 - Calculator).

23. $\mathbf{u} = \langle 2,1 \rangle, \mathbf{v} = \langle 3,-2 \rangle$

24. $\mathbf{u} = \mathbf{i} + \sqrt{3}\mathbf{j}, \mathbf{v} = -\sqrt{3}\mathbf{i} + \mathbf{j}$

25. Determine whether $\mathbf{u} = 4\mathbf{i}$ and $\mathbf{v} = -\mathbf{i} + 3\mathbf{j}$ are orthogonal. ***(Section 8.5 – NON-CALCULATOR)***

26. Given $\mathbf{u} = 3\mathbf{i} + 2\mathbf{j}, \mathbf{v} = -\mathbf{i} - 4\mathbf{j}, \mathbf{w} = 5\mathbf{i} - 3\mathbf{j}$, find $\mathbf{u} \cdot (\mathbf{v} + \mathbf{w})$. ***(Section 8.5 – NON-CALCULATOR)***

27. Find the work done by the force $\mathbf{F} = -4\mathbf{i} + 20\mathbf{j}$ in moving an object from *P*(0, 10) to *Q*(5, 25). ***(Section 8.5 - Calculator)***

28. A constant force $\mathbf{F} = \langle 2,8 \rangle$ moves an object along a straight line from point (2, 5) to the point (11, 13). Find the work done if the distance is measured in feet and the force is measured in pounds. ***(Section 8.5 - Calculator)***

CHAPTER 9 – Systems, Matrices & Inequalities

Solve the system by hand. (Sections 9.1-9.3 - Calculator)

1. $\begin{matrix} y = x^2 + 8x \\ y - 16 = 2x \end{matrix}$

2. $\begin{matrix} x - y = 4 \\ xy = 12 \end{matrix}$

For problems #3-8, carry out the operation, if possible, using the given matrices. (Section 9.5 - Calculator)

$$A = \begin{bmatrix} 4 & 6 \\ 1 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 5 \\ -3 & 7 \end{bmatrix} \quad C = \begin{bmatrix} 2 & 3 \\ 1 & 0 \\ 0 & 2 \end{bmatrix} \quad D = \begin{bmatrix} 10 & 6 \\ -3 & 5 \\ 2 & -1 \end{bmatrix} \quad E = \begin{bmatrix} 1 & -2 & 4 \\ 3 & 7 & 2 \\ 0 & 9 & -1 \end{bmatrix}$$

3. $A + B$

4. $3C - D$

5. $C + E$

6. DA

7. BA

8. B^2

9. **[Multiple Choice]** Use the matrices above to determine which product is NOT possible.

A. CB **B**. AB **C**. DE **D**. ED

For problems #10-15, carry out the operation, if possible, using the given matrices. (Sections 9.6-9.7)

$$A = \begin{bmatrix} 4 & 6 \\ 1 & 3 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 5 \\ -3 & 7 \end{bmatrix} \quad C = \begin{bmatrix} 2 & 3 \\ 1 & 0 \\ 0 & 2 \end{bmatrix} \quad D = \begin{bmatrix} 10 & 6 \\ -3 & 5 \\ 2 & -1 \end{bmatrix} \quad E = \begin{bmatrix} 1 & -2 & 4 \\ 3 & 7 & 2 \\ 0 & 9 & -1 \end{bmatrix}$$

10. B^{-1} **(NON-CALCULATOR)**

11. D^{-1} **(NON-CALCULATOR)**

12. A^{-1} **(NON-CALCULATOR)**

13. E^{-1} **(CALCULATOR)**

14. $|A|$ **(NON-CALCULATOR)**

15. $|E|$ **(NON-CALCULATOR)**

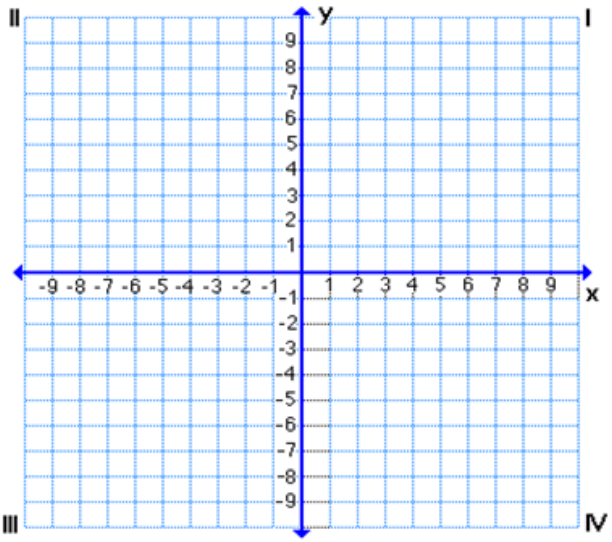
16. Solve the matrix equation $A - 2\boldsymbol{X} = B$ for matrix X if $A = \begin{bmatrix} 4 & 6 \\ 1 & 3 \end{bmatrix}$ *and* $B = \begin{bmatrix} 2 & 5 \\ -3 & 7 \end{bmatrix}$. **(9.5 – CALCULATOR)**

17. Solve the system using **inverses** of matrices: $\begin{cases} 5x + 7y + 4z = 1 \\ 3x - y + 3z = 1 \\ 6x + 7y + 5z = 1 \end{cases}$ **(9.6 – CALCULATOR)**

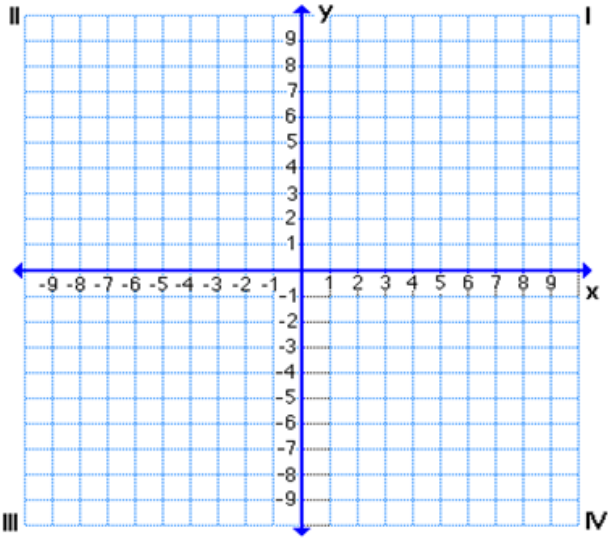
18. Solve the system using **Cramer's Rule**: $\begin{matrix} 6x + 12y = 33 \\ 4x + 7y = 20 \end{matrix}$ **(9.7 – CALCULATOR)**

Graph the system of inequalities. **(9.9 – CALCULATOR)**

19. $\begin{matrix} y > x - 3 \\ x \geq 0 \\ x^2 + y^2 \leq 25 \end{matrix}$



20. $\begin{matrix} y \geq x^2 \\ x^2 + y^2 > 16 \\ y \leq 7 \end{matrix}$



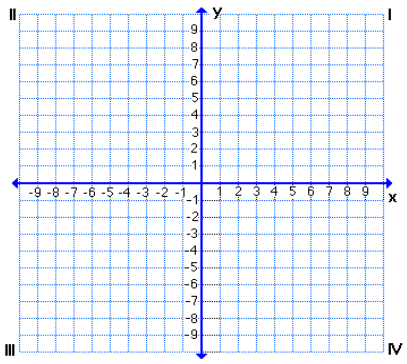
Chapter 10 – Conic Sections

1. Find the center and the exact radius of the **circle**. Then graph the circle.

$(x+3)^2+(y-4)^2=16$

Center:_____

Radius:_____



Find the equation of the circle in standard form that satisfies the given conditions.

2. The circle has center $(5,-2)$ and passes through $(-3,4)$.

3. The endpoints of the diameter of the circle are $(-1,-6)$ and $(7,-4)$.

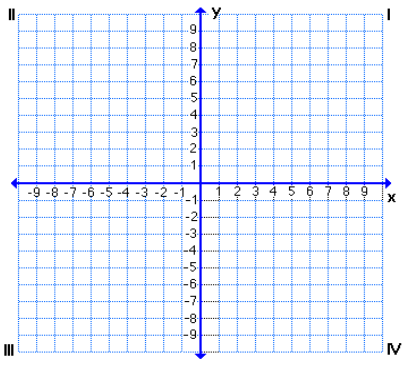
Graph the ellipse and identify the center, vertices, and foci.

4. $4(x-1)^2+16(y+3)^2=64$

Center:_____

Vert:_____

Foci:_____

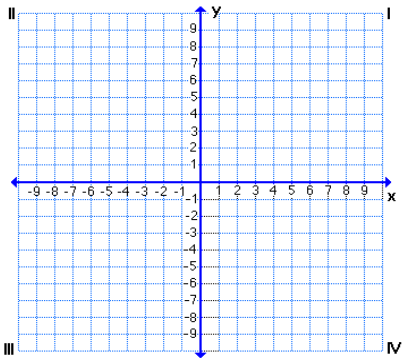


5. $\frac{(x+4)^2}{9}+\frac{(y-1)^2}{25}=1$

Center:_____

Vert:_____

Foci:_____



Find the standard form of the equation of each ellipse.

6. Foci $(0, \pm 4)$, vertices $(0, \pm 6)$

7. Endpoints of major axis: $(-9, 4)$ & $(-1, 4)$
Endpoints of minor axis: $(-5, 6)$ & $(-5, 2)$

Graph the hyperbola and identify the center, vertices, slopes of asymptotes, and foci.

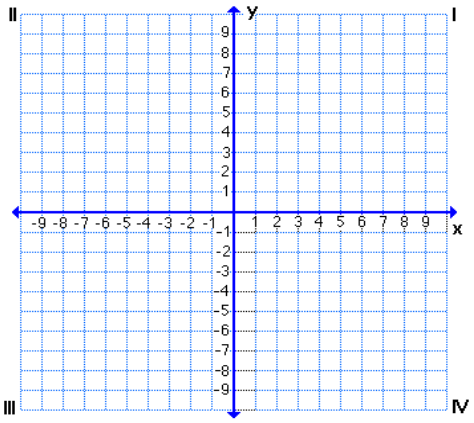
8. $\frac{(y+3)^2}{4} - \frac{(x-2)^2}{25} = 1$

Center: _____

Vertices:_____

Foci:_____

Asymptotes:_____



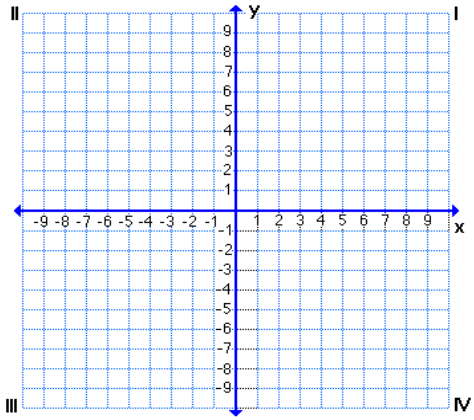
9. $4(x-1)^2 - 9(y-2)^2 = 36$

Center: _____

Vertices:_____

Foci:_____

Asymptotes:_____



Find the standard form of the equation of each hyperbola.

10. Foci $(0, \pm 4)$, vertices $(0, \pm 2)$

11. Vertices $(\pm 4, 0)$, Asymptotes: $y = \pm 2x$

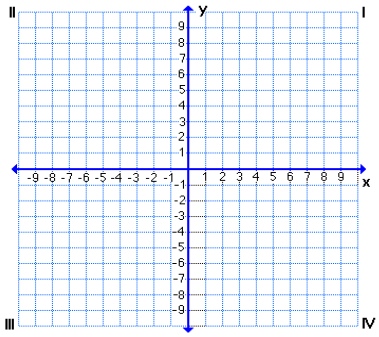
Graph the parabola and identify the vertex, directrix, and focus.

12. $(x-2)^2 = -12(y+3)$

Vertex: _____

Dir: _____

Focus: _____

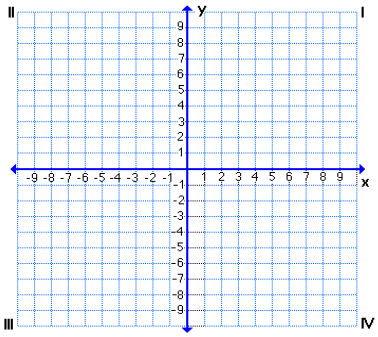


13. $(y+4)^2 = -8(x-2)$

Vertex: _____

Dir: _____

Focus: _____



Write an equation in standard form for the parabola satisfying the given conditions.

14. Vertex: $(-4,5)$; Focus $(-4,2)$

15. Focus: $(3,5)$; Directrix: $x = -1$

Convert the equation to standard form by completing the square. Then identify what type of conic section the equation represents. If it is a circle, ellipse, or hyperbola, then name its center. If it is a parabola, then name its vertex.

16. $y^2 + 4y - 6x - 8 = 0$

17. $9y^2 - 4x^2 - 18y + 24x - 63 = 0$

18. $4x^2 + 36y - 32x + 9y^2 + 64 = 0$

19. $x^2 + y^2 + 8x - 4y = 1$

Chapter 11 – Sequences & Series

Find the first five terms of the sequence. (Section 11.1 - Calculator)

1. $a_n = n^2 - 3$

2. $a_n = a_{n-1} + 5;\ a_1 = 3$

3. Find the sum: $\sum_{k=1}^{4} k^2$ ***(Section 11.1 – NON-CALCULATOR)***

4. Write the sum using sigma notation: $2 + 4 + 6 + \cdots + 20$ ***(Section 11.1 – NON-CALCULATOR)***

Determine whether the sequence is arithmetic or geometric. Then find the nth term of the sequence. (Sections 11.2-11.3 - Calculator)

5. 3, $\frac{3}{2}$, $\frac{3}{4}$, $\frac{3}{8}$, ...

6. 2, 4, 6, 8, …

7. -12, -8, -4, 0, …

8. $-8, -2, -\frac{1}{2}, -\frac{1}{8}, \ldots$

9. The 12th term of an **arithmetic sequence** is 32, and the fifth term is 18. Find the 20th term. **(Section 11.2 - *Calculator*)**

10. Which term of the **arithmetic sequence** 1, 4, 7, … is 88? **(Section 11.2 - *Calculator*)**

11. Find the partial sum of the **arithmetic sequence**: $-3 + \left(-\frac{3}{2}\right) + 0 + \cdots + 30$ **(Section 11.2 - *Calculator*)**

12. An **arithmetic sequence** has first term $a = 5$ and common difference $d = 2$. How many terms of this sequence must be added to get 2700? **(Section 11.2 - *Calculator*)**

13. The first term of a **geometric sequence** is 3, and the third term is $\frac{4}{3}$. Find the fifth term. **(Section 11.3 - *Calculator*)**

16. Which term of the **geometric sequence** 2, 6, 18, … is 118,098? **(Section 11.3 - *Calculator*)**

17. Find the partial sum of the **geometric sequence** 1 + 3 + 9 + ⋯ + 2187. **(Section 11.3 - *Calculator*)**

18. Find the sum of the **infinite geometric** *series* $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \cdots$ **(Section 11.3 - *Calculator*)**

19. Use Pascal's Triangle to expand: $(3x - 5)^5$ **(Section 11.6 - *Calculator*)**

20. Find the 18th term in the expansion of $(4x + 3y)^{21}$. **(Section 11.6 - *Calculator*)**