Name: _____   **Date:** _____   **Period:** _____

Show all work

Unit I: Conics

1) Find all characteristics of the following and graph: $5x^2 - 2y^2 + 10x - 4y + 17 = 0$

a) Conic type _____   b) Vertices _____   c) Co-Vertices _____

d) Foci _____   e) Center _____   f) Asymptotes (if any) _____

2) Find all characteristics of the following and graph: $3x^2 + 2y^2 - 12x + 12y + 29 = 0$

a) Conic type _____   b) Vertices _____   c) Co-Vertices _____

d) Foci _____   e) Center _____   f) Asymptotes (if any) _____

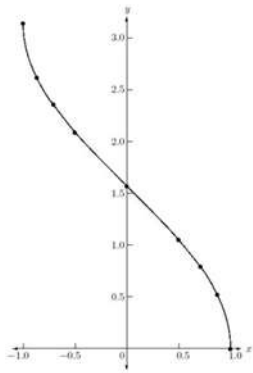**Unit 2: Trigonometric Functions**

Evaluate the following:

3) $\cot -\dfrac{15\pi}{4}$ 4) $\tan \dfrac{5\pi}{3}$ 5) $\sec -\dfrac{15\pi}{6}$ 6) $\csc 9\pi$

Evaluate the following:

7) $Arctan\left(-\sqrt{3}\right)$ 8) $\arcsin \dfrac{\sqrt{3}}{2}$ 9) $4\sin^2 x - 1 = 0$
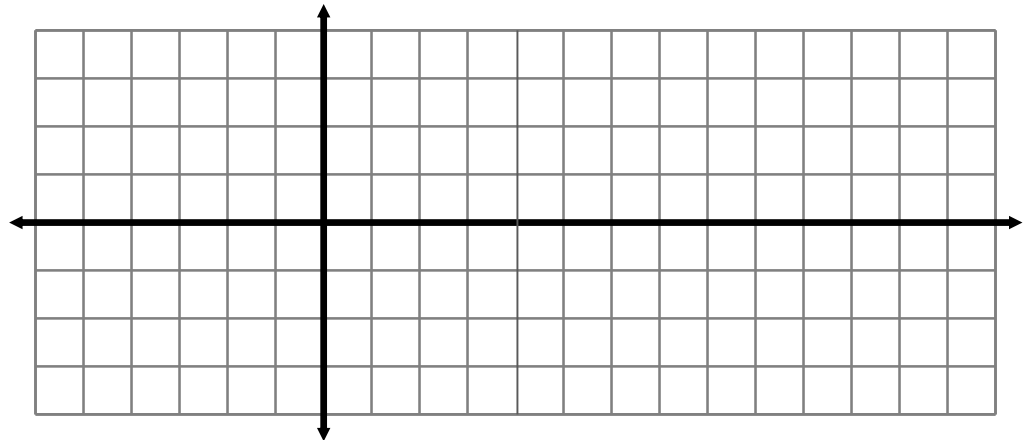
10)

Identify the function and determine its domain and range.

11) $y = -2\cos\left(2x - \frac{\pi}{2}\right) + 1$ Graph two periods and identify the following characteristics:

Amp _____

Period _____

Frequency _____

Vertical shift _____   Phase shift _____

12) *Real – World Phenomena (Sin/Cos functions)-* The average monthly temperature in Baltimore, Maryland can be described as $T = 22.5\cos\left(\frac{\pi}{6}m - \frac{7\pi}{6}\right) + 54.5$ where m represents the month of the year, January = 1, and T represents temperature.

a) What is the period of the function? _____

b) According to the model, approximately what month will Baltimore reach about 50°? _____

c) According to the model, what month will Baltimore reach its hottest temperature? _____

d) According to the model, how warm will Baltimore get in a typical year? _____

13) Write an equation of the sine function with period $\frac{\pi}{3}$, phase shift $-\frac{\pi}{4}$, and vertical shift up 2.

_____

14) Find the exact value of the following: $\cos 165°$

15) Find the exact value of the following: $\sin(-105°)$

16) $\sec\theta = 5 \ and \ tan\theta < 0$ find all 6 trig ratios.

Unit 3: Trigonometry of General Triangles

17) Find the area of the triangle given a = 41, b = 20, and c = 25

18) If a triangle has < B = 130°, a = 62, and c = 20, find its area.

19) If < A = 55°, < C = 42°, and c = $\frac{3}{4}$, find *a* from the oblique triangle.

20) How many solutions exist given the following information: < A = 100°, a = 125 meters and b = 10 meters.

21) Verify the following: $\dfrac{sec\theta - 1}{1-cos\theta} = sec\theta$

22) Simplify $\dfrac{1- sin^2 x}{sec x}$

23) Solve $sec x csc x = 2csc x$

24) Simplify / Write as one expression:

a) $cos^2 \dfrac{\pi}{8} - sin^2 \dfrac{\pi}{8}$

b) $sin20°cos30° + cos20°sin30°$

c) $cos\dfrac{\pi}{12}cos\dfrac{\pi}{6} - sin\dfrac{\pi}{12} sin\dfrac{\pi}{6}$

d) $cos^2 50° + sin^2 50°$

e) $\dfrac{1}{2sin40°cos40°}$

$$A = \begin{bmatrix} 6 & -3 \\ 1 & -2 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & 6 & 3 \\ 1 & 6 & -9 \\ 3 & -6 & 4 \end{bmatrix} \qquad C = \begin{bmatrix} 3 & -4 \\ 5 & 2 \\ -8 & 6 \end{bmatrix} \qquad D = \begin{bmatrix} -1 & 6 & 4 \\ 2 & 3 & 1 \\ 2 & 3 & -7 \end{bmatrix}$$

25) Find $|D|$ 26) Find A^{-1} 27) AC

28) Find the area of triangle DEF: D (- 11, 5), E (- 15, -2), F (12, 9) is _____

29) A parabola passes through points (-5, 81), (-1, 17), and (2, 11). Find the equation of the parabola.

_____

30) Mr. Rhodenizer, an adult education math instructor, has given his class the following puzzle. He tells the class that three shoppers were instructed to go to one particular grocery store and purchase three specific items: canned soup, cookies and detergent. They were told to purchase specific brands, sizes and permitted to pick up as many of each item as they wished without exceeding $40. The following table illustrates how much each shopper spent and how many of each item they selected. Based on this information, how much did each item cost?

	Canned Soup	Cookies	Detergent	Total Price
Shopper # 1	4	3	2	27
Shopper # 2	2	2	4	30
Shopper # 3	3	7	1	32

31) If $\vec{u}$ is $\langle - 3, 8 \rangle$ and $\vec{v}$ is $\langle 4, -5 \rangle$ then 4u – 2v equals…

32) Write the magnitude and direction for $\vec{u}$ = $7(cos115° + isin115°)$. Also write $\vec{u}$ in component form (ROUND TO TWO DECIMALS)

   magnitude = _____   direction: _____° _____ of _____

   component form: _____

33) Find vector **w** if $\|w\| = 6$ and the direction of **w** if $\theta = -42°$

    a) Write your answer in component form.

    b) Write your answer in linear combination.

    c) Write your answer in polar form.

34) Forces of 300 pounds and 750 pounds act on an object at angles of 45° and 120°, respectively, with the positive *x*-axis. Find the **magnitude and direction** of the resultant of these forces. *Think of this as two vector forces being added together.*

35) Use the vectors below to complete the following operations. Show your work by drawing the operation AND final answer.
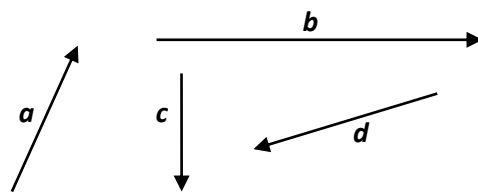
a) **− 2d − c**
                                                      b) $\frac{1}{3}a + 2b$

36) Fill in the chart below:

	7+ 4*i*	-2*i*	5 − 12*i*	3 − 4*i*
modulus				
argument				
polar form				
Draw a model				

37) If arg(*p*) = 61° and arg(*q*) = 205°, what is…

   …arg(*pq*)? _____   …arg(*p* / *q*)? _____

38) A boat leaves port and travels 36 miles at a standard position angle of 45°. The boat then travels for 5 miles in a standard position angle of 190°. At that point, the boat drops anchor. A helicopter, beginning from the same port, needs to join the boat as quickly as possible. Tell the helicopter's pilot how to get to the ship. (SHOW WORK BELOW. CIRCLE YOUR FINAL ANSWER).

39) *Ben and Diane meet up to fly a model airplane they have built together. At full power, the airplane can fly 160 kilometers per hour in calm air. Ben has the controls, and he makes the plane take off heading 25° North of East. After he feels comfortable with the controls, he turns on full power.*

A steady wind begins to blow from North to South at a speed of 32 kilometers per hour. In what direction and at what speed is the plane traveling now? _____ (10 pts)