1. [4] Find (if possible) the supplementary angle of $\theta = \frac{7\pi}{11}$.

2. [4] Find the **<u>least positive coterminal</u>** angle of $\alpha = \frac{29\pi}{7}$.

3. [12] Determine which quadrant the following angle θ and α lie:

a) $\theta = \frac{19\pi}{6}$ Quadrant _____ b) $\alpha = -570^\circ$ Quadrant _____

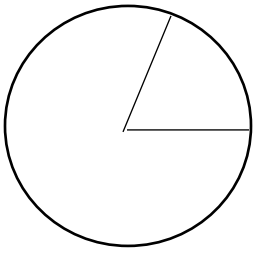
c) Find the **<u>exact value</u>** (no decimals).

$$\cos\frac{19\pi}{6} =$$

d) Find the **<u>exact value</u>** (no decimals).

$$\csc(-570^\circ) =$$

4. [6] Find the **<u>exact</u>** **<u>length</u>** (not in decimal) of the arc intercepted by a central angle of 75° in a circle with the radius of 36 feet.



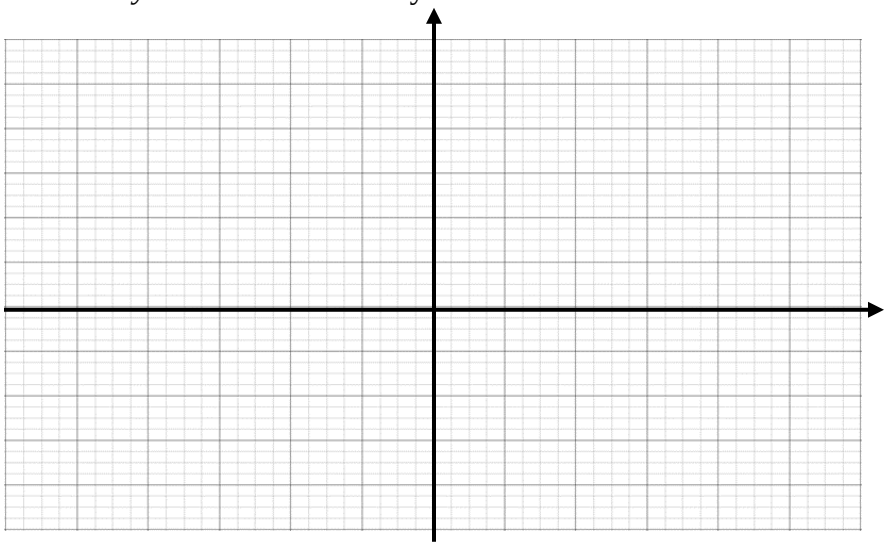
5. [6] **Circle** True or False:

a) If angle A and angle B are complementary then $\tan A = \cot B$	TRUE	FALSE
b) If angle θ lies in Quadrant III, then $\cot\theta > 0$ and $\sec\theta < 0$	TRUE	FALSE
c) $\cos(A-B) = \cos A - \cos B$	TRUE	FALSE
d) $-\frac{\pi}{2}$ is in the range of $\tan^{-1} x$.	TRUE	FALSE
e) $\cos^2 x - \sin^2 x = -1$	TRUE	FALSE
f) Dot product of two vectors is a vector	TRUE	FALSE

6. [8] Find the following for $f(x) = -4\sin\left(3x + \frac{\pi}{3}\right) - 5$.

Amplitude:	
Period:	
Phase shift:	
Range:	

7. [8] **Sketch** the graph of $y = -2\cos x + 1$ for **only one period**. **Label** all the tick marks on both x and y axis where necessary.



8. [8] a) State the **Sum identity** for $\cos(\alpha+\beta)$.

$\cos(\alpha+\beta) =$ _____

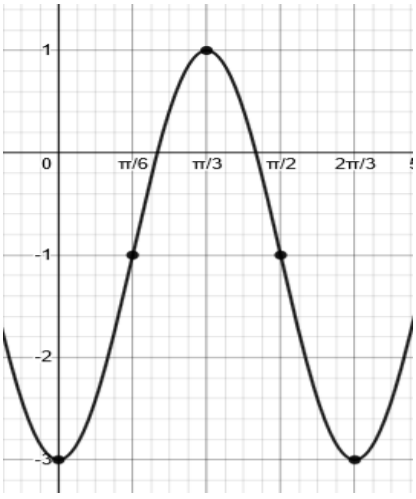
b) Assuming that $\cos\alpha = -\frac{3}{5}$ where α is in **quadrant II** and $\cos\beta = \frac{12}{13}$ where β is in **quadrant IV**. Find the **exact value** of $\cos(\alpha+\beta)$.

9. [8] Find the **exact value** of the following:

a) $\cos^{-1}\left(\cos\frac{5\pi}{6}\right) =$

b) $\sin\left(\cos^{-1}\left(\frac{x}{2}\right)\right) =$

10. [8] Given the following graph of a function, find the following



a) [1] Amplitude:

b) [1] Period:

c) [1] Phase shift:

d) [1] Axis of oscillation:

e) [4] Equation:

11. [8] Complete the following **trigonometric identities**:

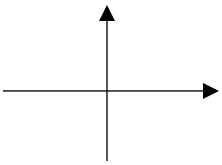
a) $1-\sin^2 x =$ _____

b) $1+\tan^2 x =$ _____

c) $\sin(2x) =$ _____

d) $\cos(2x) =$ _____

12. [6] Given $\sin x = -\frac{4}{5}$ and x is in **Quadrant III**. Find the exact value of the following.



a) $\sin(2x) =$ b) $\cos(2x) =$

13. [8] Prove that following identity by starting with one side and obtaining the other through writing a sequence of equivalent expressions.

$$\frac{\cot^2 x}{\cot^2 x+1} = \cos^2 x$$

14. [6] Use the given **substitution** to express the given radical expression as a trigonometric function without radicals. Assume θ is in quadrant I.

a) Let $x = 2\sin\theta$ then find and simplify $\sqrt{4-x^2}$.

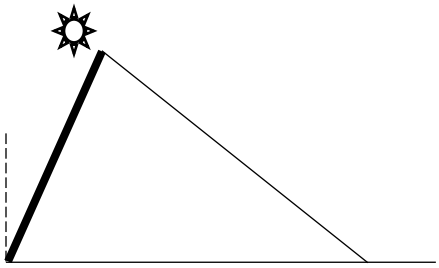
b) Then find $\tan\theta$.

15. [8] Solve: $\tan x = -\sqrt{3}$ where x is in radians. (Exact value, no decimals) (General solutions)

16. [6] Solve: $\cos^2 x = \frac{1}{4}$ in $[0, 2\pi)$ (Exact value, no decimals)

17. [8] Solve: $6\cos^2 x + \cos x - 2 = 0$ on $[0, 2\pi)$. **Round your answers to 4 decimal places where necessary.**

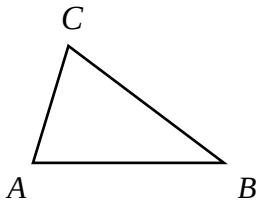
18. [8] A pole leans away from the sun at an angle of 12° to the vertical. When the angle of elevation of the sun is 58°, the pole casts a shadow $52\,ft$ long on level ground. How long is the pole? Round to the nearest foot.



19. [8] Determine **which law applies**. Then **solve the triangle** ABC, if possible.

Round your answers to **one decimal place**. $a = 18.2\,in$, $b = 13.7\,in$, $A = 75.2^\circ$

Law of _____



20. [8] a) Write the complex number $1 - i$ in **<u>trigonometric form</u>**.

b) Use **De Moivre's** theorem to raise the complex number in part a) to the given power. Write your answer in **<u>standard notation</u>,** $a + bi$.

$$(1-i)^8$$

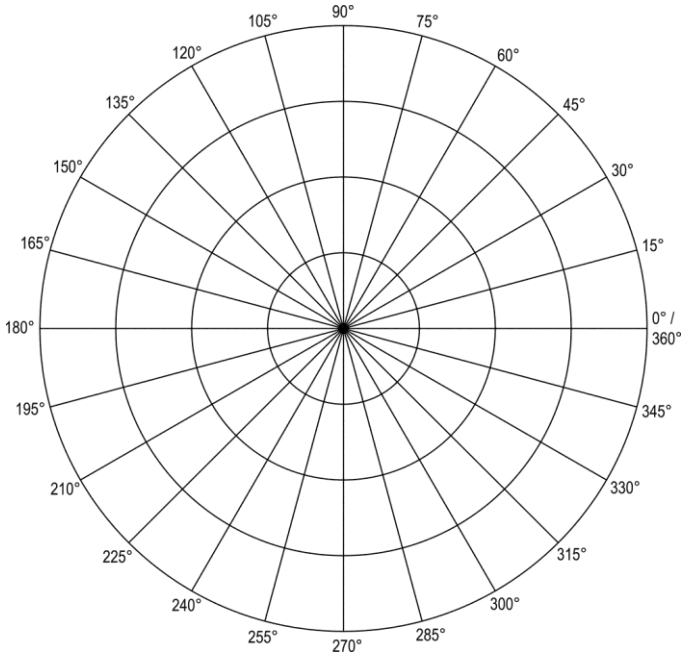
21. [8] Find the **square roots** of the complex number $-16i$. Write your answer in **standard notation,** $a+bi$.

22. [6] Convert the rectangular coordinate $(2,-2)$ to **polar coordinate**. (Exact and **do not use decimals**.)

23. [6] Convert to **Polar equation**: $y=x^2$

24. [8] Complete the table (round to one decimal place) and graph $r = 3\sin(3\theta)$.

θ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°
r													

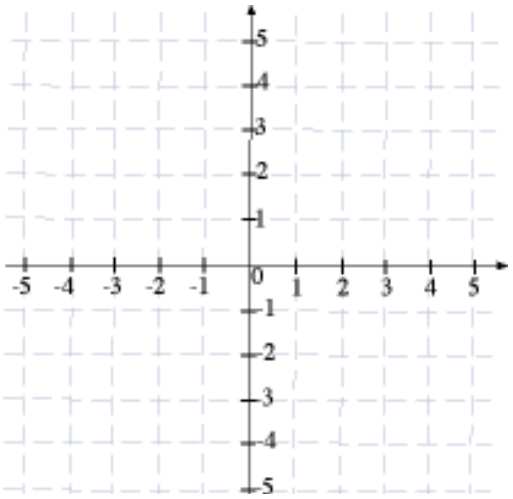


25. [6] Perform the following if $\vec{u} = \langle 5, -2 \rangle$ and $\vec{v} = \langle -4, 7 \rangle$

a) $\vec{u} - 2\vec{v}$ b) $\vec{u} \cdot \vec{v}$

26. [8] **Classify** the graph of the equation circle, a parabola, or an ellipse for part a). Find the necessary information as given and write N/A for any that do not pertain to this type of conic and **sketch the graph**:

$$\frac{(x+1)^2}{16}+\frac{(y-2)^2}{4}=1$$



a) Type of Conic: _____

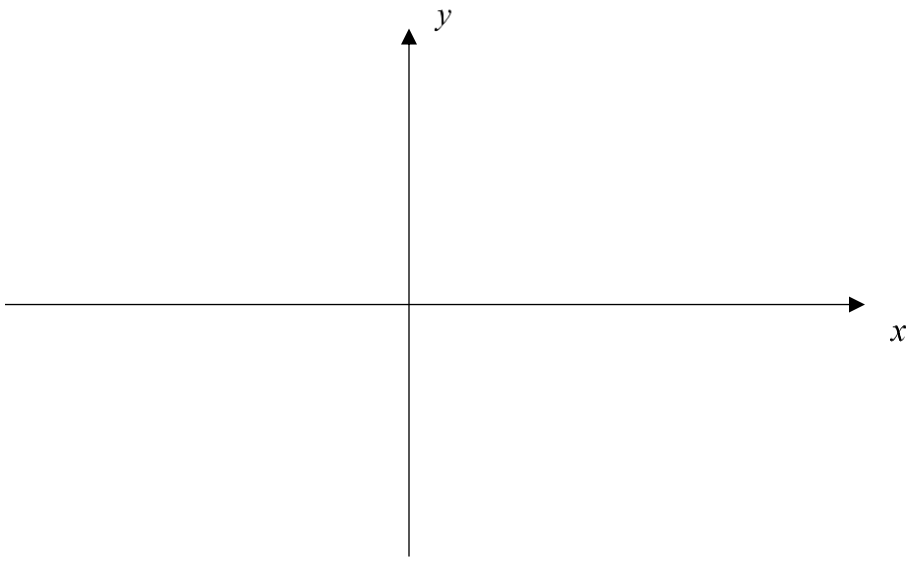
b) Center: _____

c) Vertices: _____

d) Foci: _____

27. [6] Graph: $f(x)=\tan^{-1}x$. State the domain and range of $f(x)$.

Label the necessary tick marks on both axes clearly.



Domain: _____ Range: _____

CHOOSE 1 OF THE 2 REMAINING PROBLEMS**. IF YOU DON'T CHECK A BOX, THE FIRST 1 WILL BE GRADED.**

28. [6] Find the **magnitude** of the **resultant vector** $\vec{u}+\vec{v}$ given that $|\vec{u}|=2$, $|\vec{v}|=3$ and that the angle between the vectors is 42°. Round to the **nearest tenth**.

❒
Grade?

29. [6] After taking off, an airplane reaches a speed of $130\ km/h$ on a course of 53°. A wind of $20\ km/h$ is blowing from 320°. What is the groundspeed of the plane? Round your answer to **two decimal places**.

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