

Midterm Review

Precalculus



1. Name the conic:  $9y^2 - 4x^2 + 8x - 36y + 1 = 5$

↓  
Hyperbola

\* look over  
your flow  
chart again!

2. Solve for x.

$$\begin{vmatrix} x & -3 \\ 4 & 2 \end{vmatrix} = 6 - 3x$$

Remember:

"criss  
cross"



$$2x - -12 = 6 - 3x$$

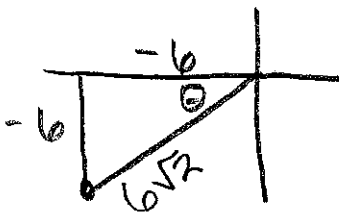
$$2x + 12 = 6 - 3x$$

$$5x = -6$$

$$x = -\frac{6}{5}$$

graph it!

3. The point  $(-6, -6)$  is on the terminal side of an angle in standard position. Find Cosecant.



$$\sin \theta = \frac{o}{h}$$

$$\csc \theta = \frac{h}{o}$$

$$= \frac{6\sqrt{2}}{-6}$$

$$= \frac{\sqrt{2}}{-1}$$

$$= -\sqrt{2}$$

$$\boxed{-\sqrt{2}}$$

$$a^2 + b^2 = c^2$$

$$(-6)^2 + (-6)^2 = c^2$$

$$36 + 36 = c^2$$

$$72 = c^2$$

^

$$6 \cdot 6 \cdot 2$$

$$6\sqrt{2} = c$$

$$\pm 2\pi \text{ or } \pm 360^\circ$$

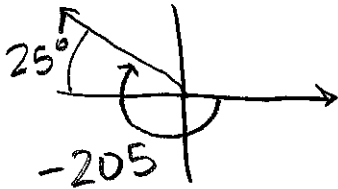
4. Find the coterminal angle between  $[0, 2\pi)$ .

$$\frac{22\pi}{9} - 2\pi$$

$$\frac{22\pi}{9} - \frac{18\pi}{9} = \boxed{\frac{4\pi}{9}}$$

↪ closest to x-axis  
↪ acute (positive  $0^\circ \rightarrow 90^\circ$  or  $0 \rightarrow \frac{\pi}{2}$ )

5. Find the reference angle:  $-205^\circ$



$$\begin{array}{r} -205 \\ + 180 \\ \hline -25^\circ \end{array} \rightarrow \boxed{25^\circ}$$

6. What is  $\csc\left(-\frac{2\pi}{3}\right)$ ?

$$\frac{2 \cdot \sqrt{3}}{-\sqrt{3} \cdot \sqrt{3}}$$

$$\boxed{-\frac{2\sqrt{3}}{3}}$$

\* look at unit circle

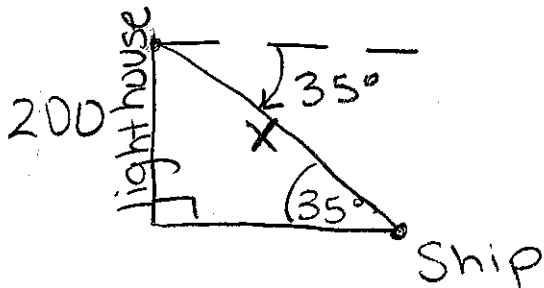
\*  $-\frac{2\pi}{3} \rightarrow$  coterminal  $\rightarrow \frac{4\pi}{3}$

\* look at Sin, then do reciprocal.

$$* \sin \frac{4\pi}{3} = -\frac{\sqrt{3}}{2}$$

horizontal; down.  
\* equals same angle  
measure as elevation.

7. From the top of a 200 foot lighthouse, the angle of depression to a ship on the ocean is  $35^\circ$ . How far is the ship to the top of the lighthouse? Round to the nearest tenth.



$$\sin \theta = \frac{o}{h}$$

$$\sin 35^\circ = \frac{200}{x}$$

$$x \sin 35^\circ = 200$$

$$x = \boxed{348.7 \text{ ft}}$$



8. Find the area of the triangle with sides 8m, 9m and 10m.

$$S = \frac{a+b+c}{2} = \frac{8+9+10}{2} = 13.5$$

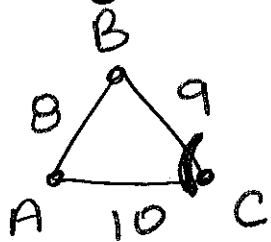
$$A = \sqrt{S(S-a)(S-b)(S-c)}$$

$$A = \sqrt{13.5(13.5-8)(13.5-9)(13.5-10)}$$

$$A = \boxed{34.2 \text{ m}^2}$$

↑ Across from smallest side.

9. Find the measure of the smallest angle in a triangle with sides 8m, 9m and 10m.



$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$8^2 = 9^2 + 10^2 - 2 \cdot 9 \cdot 10 \cos C$$
$$-9^2 \quad -9^2 \quad -10^2$$
$$-10^2$$

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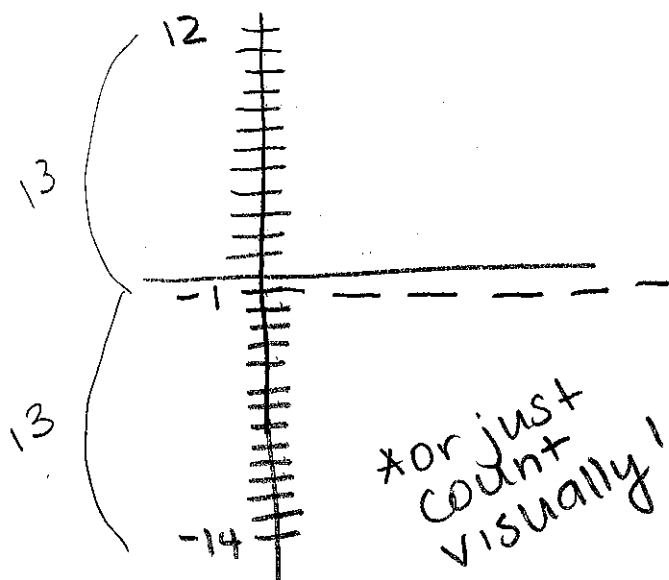
$$-117 = -180 \cos C$$

$$\frac{117}{180} = \cos C$$

$$C = 49.5^\circ$$

\* look at table SSS → LOC

10. The range of one phase of a cosine function is  $[-14, 12]$ . What is the vertical shift and amplitude?



\*or just  
count  
visually!

$$\text{VS: } \frac{-14 + 12}{2} = \frac{-2}{2} = \boxed{-1}$$

a:

$$\frac{12 - (-14)}{2} = \frac{26}{2} = \boxed{13}$$

~~x~~ complete the square  $(\frac{b}{2})^2$

11. Find the standard form of the hyperbola:

$$9y^2 - 4x^2 + 8x - 36y + 1 = 5$$

$$9y^2 - 36y - 4x^2 + 8x = 4$$

$$9(y^2 - 4y + \underline{\quad}) - 4(x^2 - 2x + \underline{\quad}) = 4 + 36 - 4$$

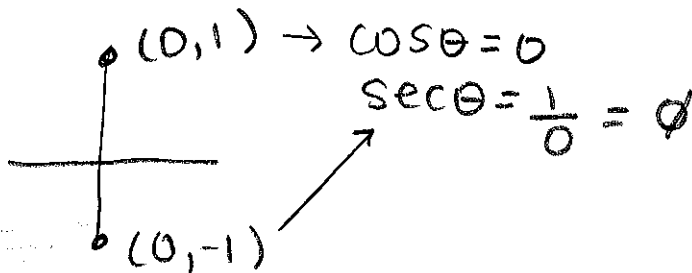
$$\left(\frac{-4}{2}\right)^2 = (-2)^2 = 4 \quad \left(\frac{-2}{2}\right)^2 = (-1)^2 = 1$$

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

$$\boxed{\frac{(y-2)^2}{4} - \frac{(x-1)^2}{9} = 1}$$

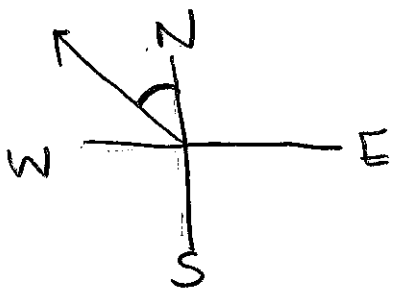
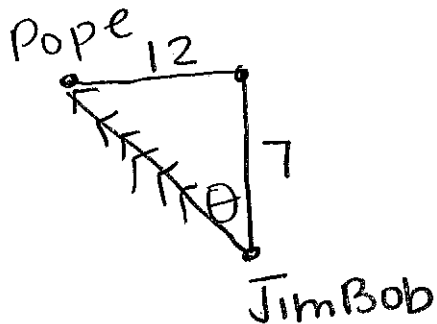
→ when  $\cos(x) = 0$

12. If secant is undefined, what are the possible angle measures from  $[0, 2\pi)$ ?



$$\frac{\pi}{2}, \frac{3\pi}{2}$$

13. JimBob's house is 12 miles east and 7 miles south of Pope. What bearing should JimBob take if he walks from his house directly to Pope?



$$\tan \theta = \frac{o}{a}$$

$$\tan \theta = \frac{12}{7}$$

$$\theta = \tan^{-1} \left( \frac{12}{7} \right)$$

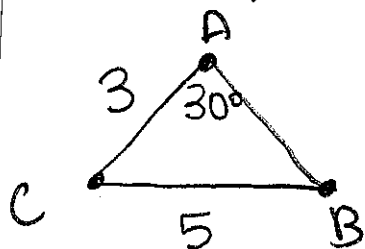
$$\theta = 59.7^\circ$$

$$\boxed{N 59.7^\circ W}$$

or

$$W 30.3^\circ N$$

14. In triangle CAB with  $A = 30^\circ$ ,  $a = 5\text{cm}$  and  $b = 3\text{cm}$ , find B.



$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{5}{\sin 30^\circ} = \frac{3}{\sin B}$$

$$5 \sin B = 3 \sin 30^\circ$$

$$\sin B = \frac{3 \sin 30^\circ}{5}$$

$$B = \sin^{-1} \left( \frac{3 \sin 30^\circ}{5} \right)$$

$$B = 17.5^\circ$$

\* Look at table  $\rightarrow A \&\& \rightarrow LOS$