Chapter 5 & 6 Review Sheet
Math 176, Precalculus, Vanden Eynden

1. Draw the unit circle and label the following values:
   a. All special angle values in radians (ie. $0, \pi/6, \pi/4, \pi/3, \pi/2, 5\pi/6, \ldots$)
   b. All special angle values in degrees (ie. $0°, 30°, 45°, 60°, 90°, 120°, \ldots$)
   c. The (x, y) coordinates of all corresponding terminal points.
   d. Which of the 6 trig functions are positive in quadrant I? II? III? IV?

2. Name the domain and range of all 6 trig functions.

3. Know how to quickly sketch the graphs of $\cos x$, $\sin x$, $\tan x$, $\sec x$, $\csc x$, *and* $\cot x$.

4. Evaluate each trig expression. If possible be <u>exact</u>, otherwise, use a calculator correct to 5 decimals. [for example: the answer $\sqrt{2}/2$ is EXACT, while the answer 0.70711 is NOT EXACT]

   a. $\cos\left(\frac{5\pi}{4}\right)$ b. $\csc 270°$ c. $\tan 2\pi$ d. $\csc\left(\frac{\pi}{7}\right)$

   e. $\sec\left(\frac{9\pi}{2}\right)$ f. $\cot\left(\frac{-5\pi}{6}\right)$ g. $\sec 40°$ h. $\cos(-135°)$

   i. $\sin\left(-\frac{\pi}{2}\right)$ j. $\tan 2$ k. $\sin 5°$ l. $3\cos 0 + 2$

   m. $\cos^{-1}(-1)$ n. $\sin^{-1}\left(-\frac{1}{2}\right)$ o. $\tan^{-1}(5)$ p. $\cot\left(\sin^{-1}\left(\frac{7}{25}\right)\right)$

5. Use fundamental identities to write $\tan t$ in terms of $\sin t$, for t in quadrant IV.

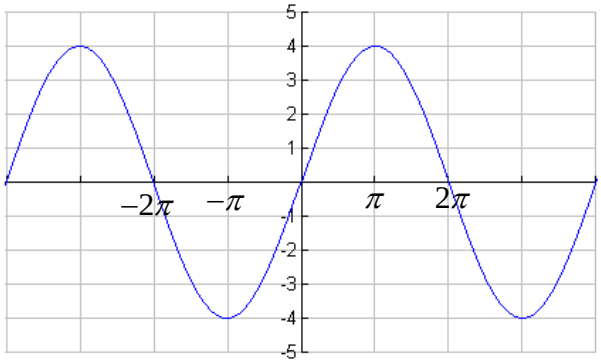
6. Find the values of all 5 remaining trig functions given $\sin\theta = \frac{5}{12}$ and θ in quadrant II.

For each of following trig functions, find:
   a. amplitude (if applicable)
   b. period
   c. phase shift
   d. sketch the graph (including asymptotes, if applicable)

7. $y = 3\sin 4x$ 8. $y = \tan(3\pi x)$ 9. $y = \cos 2(x - \pi/2)$

10. $y = \sec(x + \pi/4)$ 11. $y = |\sin x|$ 12. $y = \cot 3(x + \pi/3)$

13. The graph of a sine function of the form $y = a\sin kx$ is graphed. Determine the function

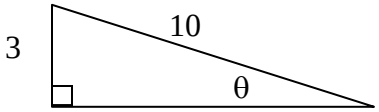


14. Convert $123°$ to radians. Convert $\frac{4\pi}{9}$ rad to degrees. Be exact (no decimal approximation)

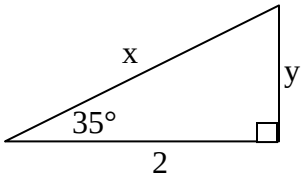
15. Name 2 other angles coterminal to $\frac{3\pi}{4}$. Name 2 other angles coterminal to $372°$.

16. Consider a circle of radius 5.
    a. What is the length of the arc that subtends the angle $\theta = 3\pi/4$?
    b. Find the area of the circular sector with central angle $\theta = 7\pi/6$

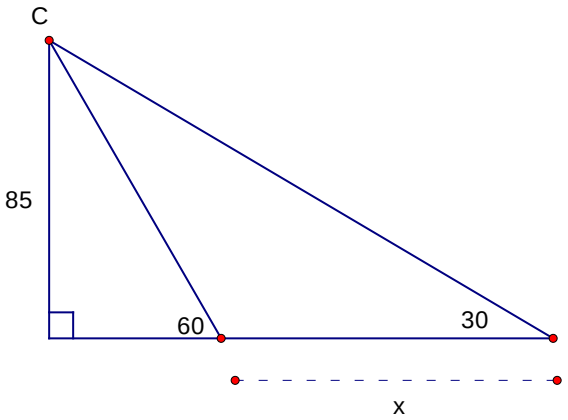
17. Find the values of the six trig functions of θ given the right triangle→.



18. Find the sides labeled x and y, correct to 2 decimals.

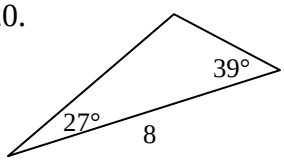


19. Find x, correct to 2 decimals →



If possible, solve each triangle.

20.



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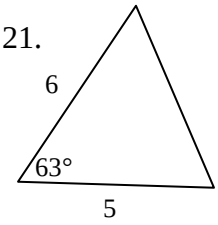

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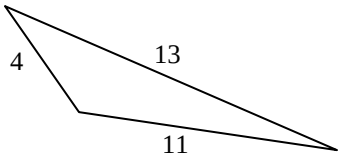

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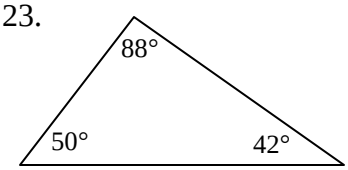

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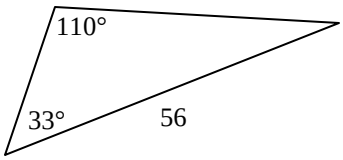

25. Use the Law of Sines to solve for all possible triangles that satisfy $\angle A = 25°, a = 5, b = 8$.

26. Nikita's kite is flying at the end of her string, which is 100 m long. She estimates the angle of elevation to the kite is 35^{o}. How high is the kite flying, given this estimate?

27. When an airplane leaves the runway, its angle of elevation is $18°$ and its speed is 275 feet per second. Find the plane's altitude after 1 minute.

Chapter 5 and 6 Formulas to know:

For t on the unit circle:

$$\sin t = y \qquad \cos t = x \qquad \tan t = \frac{y}{x}$$

$$\csc t = \frac{1}{y} \qquad \sec t = \frac{1}{x} \qquad \cot t = \frac{x}{y}$$

For angle θ, and radius r:

$$\sin\theta = \frac{y}{r} \qquad \cos\theta = \frac{x}{r} \qquad \tan\theta = \frac{y}{x}$$

$$\csc\theta = \frac{r}{y} \qquad \sec\theta = \frac{r}{x} \qquad \cot\theta = \frac{x}{y}$$

$$\csc t = \frac{1}{\sin t} \qquad \sec t = \frac{1}{\cos t} \qquad \cot t = \frac{1}{\tan t} = \frac{\cos t}{\sin t}$$

$$\sin^2 t + \cos^2 t = 1 \qquad \tan^2 t + 1 = \sec^2 t \qquad 1 + \cot^2 t = \csc^2 t$$

To convert from radians to degrees: multiply by $\frac{180}{\pi}$

To convert from degrees to radians: multiply by $\frac{\pi}{180}$

Length of a circular arc that subtends the central angle θ: $s = r\theta$

Area of a circular sector with central angle θ: $A = \frac{1}{2}r^2\theta$

Given any RIGHT triangle:

$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \tan\theta = \frac{\text{opposite}}{\text{adjacent}}$$

$$\csc\theta = \frac{\text{hypotenuse}}{\text{opposite}} \qquad \sec\theta = \frac{\text{hypotenuse}}{\text{adjacent}} \qquad \cot\theta = \frac{\text{adjacent}}{\text{opposite}}$$

Area of any triangle with sides of length a and b and with included angle θ: $A = \frac{1}{2}ab\sin\theta$

Law of Sines: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Law of Cosines:

$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$b^2 = a^2 + c^2 - 2ac\cos B$$
$$c^2 = a^2 + b^2 - 2ab\cos C$$