MATH 150 Pre-Calculus

Fall, 2014, WEEK 13

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Week 13: 8G, 8H

Chapter 8G. Law of Sines and Law of Cosines

The **Law of Sines** says that in any triangle the lengths of the sides are proportional to the sides of the corresponding opposite angles.

The Law of Sines

In triangle ABC, we have

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

Ex1) A triangle has two sides of length 3 inches and 5 inches with the angle opposite the side of length 5 inches equal to $25°$. Determine the length of the third side.

The Law of Cosines

In any triangle ABC, we have

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

Ex2) The sides of a triangle are $a = 5$, $b = 8$ and $c = 12$. Find the angles of the triangle.

Ex3) Solve triangle ABC, where $\angle A = 46.5°$, $b = 10.5$ and $c = 18.0$.

Ex4) Let $\triangle ABC$ be such that $b = 3$, $c = 5$, and $B = 25°$. Solve this triangle.

Chapter 8H. Solving Trigonometric Equations

An equation that contains trigonometric functions is called a **trigonometric equation**. To solve a trigonometric equation, we use the rules of algebra to isolate the trigonometric function on one side of the equal sign. Then we use our knowledge of the values of the trigonometric functions to solve for the variable.

Ex5) Solve the equation $2\sin x - 1 = 0$.

a) in the interval $[0, 2\pi]$

b) the general solution

Ex6) Solve the equation $\tan^2 x - 3 = 0$.

a) in the interval $[-\frac{\pi}{2}, \frac{\pi}{2}]$

b) the general solution

Ex7) Solve the equation $2\cos^2 x - 7\cos x + 3 = 0$.

Ex8) Solve the equation $\sin 2x - \cos x = 0$.

Ex9) Solve the equation $\cos x + 1 = \sin x$ in the interval $[0, 2\pi)$.

Ex10) Consider the equation $2\sin 3x - 1 = 0$.

a) Find all solutions of the equation.

b) Find the solutions in the interval $[0, 2\pi)$.

Ex11) Consider the equation $\sqrt{3}\tan\frac{x}{2} - 1 = 0$

a) Find all solutions of the equation.

b) Find the solutions in the interval $[0, 4\pi)$.

Ex12) Solve the equation $\tan^2 x - \tan x - 2 = 0$.