Section 6.1

The Law of Sines

If ABC is a triangle with sides a, b, and c, then

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad \text{or equivalently,} \quad \frac{\sin A}{a} = \frac{\sin B}{B} = \frac{\sin C}{C}$$

The Law of Sines can be used to solve the following types of triangles: AAS, ASA, and SSA. Note that with an SSA triangle, ambiguity may exist as to the number of possible triangles that can be formed with the given information.

Problem 1. Use the Law of Sines to solve each triangle. Round your answers to two decimal places.

a) $A = 35.2°,\ B = 98.1°,\ b = 13.2$

b) $A = 42°,\ B = 105°$, and $c = 42$

c) $A = 36°,\ a = 9,\ b = 6$

Problem 2. Use the Law of Sines to solve (if possible) the triangle. If two solutions exist, find both. Round your answers to two decimal places.

a) $A = 62°,\ a = 10,\ b = 12$

b) $A = 98°,\ a = 10,\ b = 3$

c) $A = 54°,\ a = 7,\ b = 10$

Problem 3. Find two triangles for which $c = 29,\ b = 46$, and $C = 31°$.

Homework: Read section 6.1, do #5, 13, 17, 27, 39, 47

Section 6.2

The Law of Cosines

Standard Form

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$b^2 = a^2 + c^2 - 2ac\cos B$$

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

Alternative Form

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos B = \frac{a^2 + c^2 - b^2}{2ac}$$

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

The Law of Cosines can be used to solve SSS and SAS triangles.

Problem 1. Use the Law of Cosines to solve the triangle. Round your answers to two decimal places.

a) $a = 31,\ b = 52,\ c = 28$

b) $A = 49°,\ b = 15,\ c = 42$

Problem 2. Determine whether the Law of Sines or the Law of Cosines is needed to solve each triangle.

a) $A = 15°,\ B = 58°,\ c = 94$

b) $a = 96,\ b = 43,\ A = 105°$

c) $a = 24,\ b = 16,\ c = 29$

Homework: Read section 6.2, do #5, 11, 17, 31, 47, 53