

**Problem 1.** If in a triangle  $ABC$ , we have that  $\sin A = 7/9$ , what are the values of  $\cos A$  and  $\tan A$ ?

*Solution.* We have the basic trigonometric identity:

$$\sin^2 A + \cos^2 A = 1$$

In our case, we know  $\sin A = 7/9$ , so we replace in the previous equation to get:

$$\left(\frac{7}{9}\right)^2 + \cos^2 A = 1$$

or equivalently

$$\frac{49}{81} + \cos^2 A = 1.$$

We want to solve for  $\cos A$  so we get

$$\cos^2 A = 1 - \frac{49}{81} = \frac{32}{81}$$

so we apply square root to get

$$\cos A = \sqrt{\frac{32}{81}} = \frac{4\sqrt{2}}{9}.$$

To find  $\tan A$  we recall that  $\tan A = \frac{\sin A}{\cos A}$ , so using the information we already have we find that

$$\tan A = \frac{\frac{7}{9}}{\frac{4\sqrt{2}}{9}} = \frac{7}{4\sqrt{2}} = \frac{7\sqrt{2}}{8}$$

which gives the final answer. □