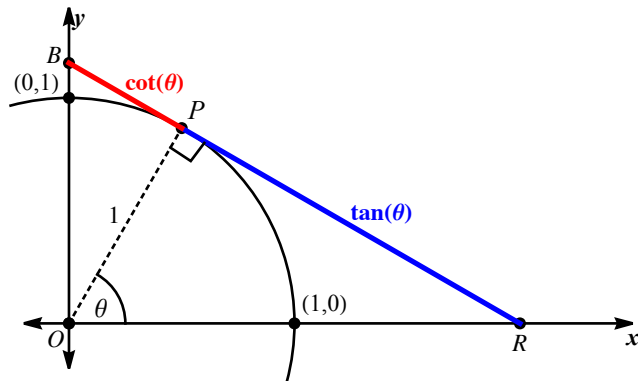


Trigonometry 35: Pythagorean Identities, Part II

When we defining the sine and cosine functions, we derived our first Pythagorean identity:

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

If we use the diagram that shows the definitions of tangent and cotangent functions, we can use the two right triangles in that diagram (OPR and OPB) to derive two more Pythagorean identities.



Using triangle OPR:

$$\begin{aligned} OP^2 + PR^2 &= OR^2 \\ 1 + \tan^2 \theta &= \sec^2 \theta \end{aligned}$$

And, using triangle OPB:

$$\begin{aligned} OP^2 + BP^2 &= OB^2 \\ 1 + \cot^2 \theta &= \csc^2 \theta \end{aligned}$$