

Derive™ Tutorial Six

Trigonometric Identities

You can use the Display Step feature of Derive to verify trigonometric identities. To use this feature, Author $\cos(x)\tan(x)=1/\csc(x)$. Click on Simplify and look among the selections. To the left of Display Step is its icon. Select Display Step. Notice in the History window the transformation of $\tan(z)$ to $\sin(z)/\cos(z)$ has been applied to the original identity. Now for the next step. In the Icon menu bar, click on the Display Step icon to see the next step in verifying the identity. Notice the transformation of $\csc(z)$ to $1/\sin(z)$ has been applied. The resulting identity, $\sin(x)=\sin(x)$ verifies the original identity.

For a more complicated example, Author $(1 - \sin(x))(\sec(x) + \tan(x)) = \cos(x)$. Click on the Display Step icon until the two sides of the equation are identical. Notice the transformations that were used (in blue) on the left and that the last step was an algebraic simplification rather than a trigonometric one. In order to improve your ability to use trigonometric transformations to verify identities, you should carefully observe and reflect on the steps Derive uses.

As a last example using two variables, you will see graphically that $\cos(x + y) \neq \cos(x) + \cos(y)$. To do this, Author the expression $\cos(x + y)$ and click on the 3D-plot icon to the right of the 2D-Plot icon. Now click on the 3D-Plot icon in the middle of the Icon menu bar. The three dimensional plot appears. Now Author $\cos(x) + \cos(y)$ and click on the 3D-Plot icon. When you click on the 3D-Plot icon in the middle of the Icon menu bar, you will see that the two graphs are not the same.

You can dramatically improve your ability to prove trigonometric identities by using the Display Step facility of Derive and carefully observing the replacements that Derive uses in the proof.