eCard Sample File

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Last Revision Date: March 19, 2009

QUESTION

Use the reciprocal and quotient formulas to verify

$$\sec t \cot t = \csc t.$$

HINT

QUESTION

Without the use of a calculator determine the value of $\cos(\pi/12)$.

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QUESTION

Complete the following:

$$\cos \pi/3 =$$

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QUESTION

Quiz Which of the following is equal to $\cos(\alpha+\beta)$?

(a) $\cos\alpha\cos\beta - \sin\alpha\sin\beta$

(b) $\cos\alpha\cos\beta + \sin\alpha\sin\beta$

(c) $\sin\alpha\cos\beta + \cos\alpha\sin\beta$

(d) $\cos\alpha\cos\beta - \sin\alpha\sin\beta$

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QUESTION

Quiz

$$\frac{\sin t - \sin 3t}{\sin^2 t - cos^2 t} =$$

- ☐ $\cos t$.
- ☐ $2 \sin t$.
- ☐ $\sin t$.
- ☐ $2 \cos t$.
- ☐ None of the above

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HINT

Recall that

$$\sec t = \frac{1}{\cos t} \text{ and } \cot t = \frac{\cos t}{\sin t}.$$

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ANSWER

Since $\sec t = \frac{1}{\cos t}$ and $\cot t = \frac{\cos t}{\sin t}$ we have

$$\sec t \cot t = \frac{1}{\cos t}\frac{\cos t}{\sin t} = \frac{1}{\sin t} = \csc t.$$

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HINT

Note that

$$\frac{\pi}{12} = \frac{\pi}{3} - \frac{\pi}{4}.$$

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ANSWER

$$\cos \pi/12 = \frac{\sqrt{2}}{4}(1+\sqrt{3})$$

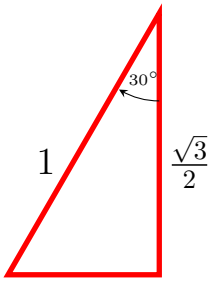
SOLUTION

Since $\frac{\pi}{12} = \frac{\pi}{3} - \frac{\pi}{4}$ we have

$$\begin{aligned}
\cos\frac{\pi}{12} &= \cos\left(\frac{\pi}{3} - \frac{\pi}{4}\right) \\
&= \cos\frac{\pi}{3}\cos\frac{\pi}{4} + \sin\frac{\pi}{3}\sin\frac{\pi}{4} \\
&= \frac{1}{2}\frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2}\frac{\sqrt{2}}{2} \\
&= \frac{\sqrt{2}}{4}(1+\sqrt{3}).
\end{aligned}$$

HINT

The following triangle may help you determine $\cos \frac{\pi}{3}$.



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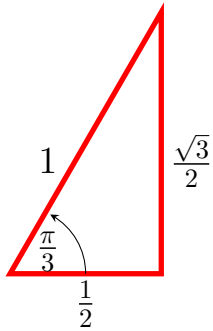
ANSWER

From the triangle below we see that

$$\cos \pi/3 = \frac{1/2}{1} = 1.$$



HINT

$$\sin^2 t - \cos^2 t = -\cos 2t$$

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ANSWER

Using an appropriate Factoring Identity and the property that the sine function is even write

$$\begin{aligned}\sin t - \sin 3t &= 2\cos 2t \sin(-t)\\ &= -2\cos 2t \sin t.\end{aligned}$$

Since $\sin^2 t - \cos^2 t = -\cos 2t$ we have

$$\frac{\sin t - \sin 3t}{\sin^2 t - \cos^2 t} = \frac{-2\cos 2t \sin t}{-\cos 2t} = 2\sin t.$$

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Solutions to Quizzes

Solution to Quiz:

$$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$$

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