Questions: Trigonometric identities (radians)

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Summary

A selection of questions on trigonometric identities, where angles are measured in radians.

Before attempting these questions, it is recommended that you read Guide: Trigonometric identities (radians).

Q1

Using trigonometric identities, find the values of the following expressions:

1.1. $2(6\sin^2(\theta)) + 3(4\cos^2(\theta))$.

1.2. $10(7\sin^2(\theta)) + 14(5\cos^2(\theta))$.

1.3. $5\left(\dfrac{6}{\csc^2(\theta)}\right) + 15\left(\dfrac{2}{\sec^2(\theta)}\right)$.

1.4. $(\cos^2(\theta) - \sin^2(\theta))^2 + 4sin^2(\theta)\cos^2(\theta)$

1.5. $2\sin(\pi/6)\cos(\pi/12) + 2\cos(\pi/6)\sin(\pi/12)$

1.6. $3\cos(\pi/4)\cos(\pi/12) - 3\sin(\pi/4)\sin(\pi/12)$

1.7. $\sin(5\pi/6) + \sin(\pi/6)$

1.8. $\cos(5\pi/6) + \cos(\pi/6)$

Q2

Simplify the following expressions:

2.1. $\tan(\theta)\cos(-\theta)$

2.2 $\tan(-\theta)\csc(-\theta)\sec(-\theta)$

2.3. $\tan^2(\theta) + \sin^2(\theta) + \cos^2(\theta)$

2.4. $\dfrac{2\sin(\theta)}{\cos(\theta)(1-\tan^2(\theta))}$

2.5. $\dfrac{\sin(7\theta) + \sin(3\theta)}{\cos(7\theta) - \cos(3\theta)}$

2.6. $\dfrac{\sin(5\theta) - \sin(\theta)}{\cos(5\theta) + \cos(\theta)}$

Q3

Using trigonometric identities, answer the following questions:

3.1. What is the value of $\cos(-7\pi/6)$?

3.2. What are the values of $\sin(3\pi/4)$ and $\sin(5\pi/4)$?

3.3. If $\sin(5\pi/18)$ has the value 0.766 (to 3 decimal places), what is the value of $\cos(13\pi/18)$ to three decimal places?

Q4

Using trigonometric identities find **exact** values of the following:

3.1. $\sin(\pi/12)$

3.2. $\cos(\pi/12)$

3.3. $\tan(\pi/12)$

3.4. $\sin(5\pi/12)$

3.5. $\cos(5\pi/12)$

3.6. $\tan(5\pi/12)$

After attempting the questions above, please click this link to find the answers.

Version history and licensing

v1.0: initial version created 08/23 by Dzhemma Ruseva as part of a University of St Andrews STEP project.

- v1.1: edited 05/24 by tdhc, and split into versions for both degrees and radians.