Questions: Rearranging equations involving trigonometry and logarithms

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Summary

This is a question set based on the content in the guide Introduction to rearranging equations involving trigonometry and logarithms. It's intended to be completed after having read that, and there is an answer sheet to match this question set. Note that answers are vague, as questions are based off of examples in the guide.

THIS MATERIAL IS PLANNED TO BE SPLIT INTO TWO GUIDES. (1) SOLVING TRIGONOMETRIC EQUATIONS (2) SOLVING LOGARITHMIC EQUATIONS.

Before attempting these questions, it is highly recommended that you read the guide 'Introduction to rearranging equations with trig and logs'

Q1

Solve each of these equations assuming we are using radians as our angle unit.

1.1 $sin(x) = \frac{\sqrt{2}}{2}$

1.2 $cos(2x + 1) = \frac{1}{2}$

1.3 $tan(5x - 1) = \frac{\sqrt{2}}{2}$

1.4 $cos(x^2 + 4x + 3) = 1$

Q2

Using that $1 + \cot^2(x) = \csc^2(x)$, prove that $\sin^2(x) + \cos^2(x) = 1$.

Q3

Solve $5\cos(x) + 9\sin(x) = 10$ by expressing in the form $R\sin(x + \theta)$.

Q4

$\log_a(b) = c$ Label a, b, and c in the following

4.1 $\log_6(36) = 2$

4.2 $3^7 = 2187$

4.3 $e^x = y$

4.4 $2\log_2(3) = 3.17...$

4.5 $2\log_2(2) = 2$

Q5

Solve these logarithmic equations

5.1 $6\log_3(x) + \log_3(5) = 9$

5.2 $\log_2 16x = 6$

5.3 $e^{\ln(3x)} = y$ Find y in terms of x.

Q6

Solve these simultaneous equations

$$2^y = 4x - 7$$

and

$$\log_2(x) = y$$

Q7

Solve these equations to 3sf

7.1 $e^{-x} + 3e^x = 12$

7.2 $4e^(x) + e^{-x} = 9$

Q8

8.1 $\log_{16}(x) = \log_2(y)$ Represent y in terms of x.

8.2 $\log_3(x) = \log_{27}(y)$ Represent y in terms of x.

8.3 $log_9(x) + log_3(2x) = 6$ Solve for x.