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VCE Mathematical Methods ½
Circular Function II [4.2]
Homework

Admin Info & Homework Outline:



Student Name	
Questions You Need Help For	
Compulsory Questions	Pg 2-Pg 16
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Section A: Compulsory Questions

Sub-Section [4.2.1]: Finding General Solutions of Trigonometric Functions

Question 1



Find a general solution for x in the following expressions:

a. $\sin\left(x - \frac{\pi}{3}\right) = \frac{1}{2}$

b. $\cos(2x) = -\frac{1}{2}$

c. $\tan(-x) = 1$

d. $\sin\left(\frac{x}{2}\right) = -1$

e. $\cos(x + \pi) = 0$

f. $\tan(3x) = \sqrt{3}$

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Question 2

Find a general solution for x in the following expressions:

a. $2 \sin\left(-3x - \frac{\pi}{6}\right) = \sqrt{3}$

b. $-\cos\left(2x + \frac{\pi}{3}\right) = \frac{1}{2}$

c. $1 - \tan\left(\pi x + \frac{\pi}{4}\right) = 0$

d. $-3 \sin\left(\frac{3}{2}x + \frac{\pi}{3}\right) = \frac{3}{2}$

e. $4 \cos\left(-\pi x - \frac{\pi}{2}\right) + 2 = 0$

f. $\frac{1}{2} \tan\left(-2x + \frac{\pi}{2}\right) = -\frac{\sqrt{3}}{2}$


Question 3

Solve the following equations under their domain restrictions. Express your answers as general solutions.

a. $\sin\left(-2x + \frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}, x \in [0, \infty)$

b. $-2\cos\left(3x + \frac{\pi}{6}\right) + 1 = 0, x \in (-\infty, 0]$

c. $\tan\left(-\frac{5x}{3} - \frac{\pi}{3}\right) = \sqrt{3}, x \in [-2\pi, \infty)$

Question 4 Tech-Active.

Solve the following equations under their domain restrictions. Express your answers as general solutions.

a. $\sin\left(3x - \frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}, x \in (0, \infty)$

b. $\cos\left(2x + \frac{\pi}{3}\right) = -\frac{1}{2}, x \in (-\infty, 0)$

c. $\tan\left(-\frac{3x}{2} + \frac{\pi}{6}\right) = \sqrt{3}, x \in (-\infty, -2\pi) \cup (3\pi, \infty)$

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Sub-Section [4.2.2]: Solving Hidden Quadratic Equations for Trigonometric Functions

Question 5



Solve the following equations for x .

a. $\sin^2(x) - 2 \sin(x) + 1 = 0$

b. $2 \cos^2(x) - \cos(x) - 1 = 0, x \in [0, 2\pi]$

c. $\tan^2(x) - 3 = 0$

Question 6


Solve the following equations for x .

a. $2 \sin^2(x) + 3 \sin(x) - 2 = 0, x \in [-2\pi, 0]$

b. $\cos^2\left(x - \frac{\pi}{3}\right) - 3\cos\left(x - \frac{\pi}{3}\right) + 2 = 0$

c. $\tan^2\left(x + \frac{\pi}{2}\right) + \tan\left(x + \frac{\pi}{2}\right) = 0$

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Question 7

Solve the following equations for x .

a. $2\sin^2(x) + 3\sin(-x) + 1 = 0, x \in [-\pi, \pi]$

b. $2\cos^2\left(\frac{\pi}{2} - x\right) - \cos\left(x + \frac{\pi}{2}\right) - 1 = 0$

c. $\tan^2(x) + \cos^2(x) + \sin^2(x) = 2, x < 0$

Question 8 Tech-Active.

Solve the following equations for x , giving answers that are not a rational multiple of π to 2 decimal places.

a. $3 \sin^2\left(2x - \frac{\pi}{3}\right) + 5 \sin\left(2x - \frac{\pi}{3}\right) + 2 = 0, x \in \left[-\frac{\pi}{2}, \frac{3\pi}{2}\right]$

b. $-4 \cos^2\left(-x + \frac{\pi}{4}\right) + 3 \cos\left(x - \frac{\pi}{4}\right) + 1 = 0, x > 0$

c. $2 \tan^2\left(\frac{3x}{2} + \frac{\pi}{2}\right) + 3 \tan\left(\frac{3x}{2} + \frac{\pi}{2}\right) - 5 = 0, x < 2\pi$

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Sub-Section: The 'Final Boss'

Question 9

Consider the function $f(x) = 2 \sin^2 \left(2x - \frac{\pi}{4} \right) - 3 \sin \left(2x - \frac{\pi}{4} \right) + 1$.

- a. Express the x -values of the x -intercepts of $f(x)$ using a general solution.

- b. Hence, find the coordinates of the x -intercepts in the interval:

- i. $x \in [0, 2\pi]$

- ii. $x \in [-2\pi, 0]$

iii. $x \in [0, \infty)$

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Section B: Supplementary Questions

Sub-Section [4.2.1]: Finding General Solutions of Trigonometric Functions

Question 10



Find a general solution for x in the following expressions:

a. $\sin\left(x + \frac{\pi}{6}\right) = -\frac{1}{2}$

b. $\cos\left(\frac{x}{2}\right) = \frac{\sqrt{3}}{2}$

c. $\tan(2x) = -1$

d. $\sin(x - \pi) = 0$

e. $\cos(3x) = 1$

f. $\tan\left(x + \frac{\pi}{2}\right) = \sqrt{3}$

Question 11


Find a general solution for x in the following expressions:

a. $-2 \sin\left(-x + \frac{\pi}{2}\right) + 1 = 0$

b. $\cos\left(-2x - \frac{\pi}{6}\right) = -\frac{1}{2}$

c. $3 \tan(3x + \pi) + \sqrt{3} = 0$

d. $1 + \sin\left(4x + \frac{\pi}{4}\right) = 0$

e. $-\cos\left(\pi x - \frac{\pi}{2}\right) = \frac{\sqrt{2}}{2}$

f. $\tan\left(-x - \frac{\pi}{3}\right) = -1$

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Question 12

Find the general solution for x in the following expressions:

a. $\sin\left(3x + \frac{\pi}{6}\right) = \frac{1}{2}, x > 0$

b. $\cos\left(-2x + \frac{\pi}{4}\right) = 0, x > 0$

c. $\tan\left(4x - \frac{\pi}{2}\right) = \sqrt{3}, x < 0$



Sub-Section [4.2.2]: Solving Hidden Quadratic Equations for Trigonometric Functions

Question 13



Solve the following equations for x .

a. $\sin^2(x) + 2 \sin(x) - 3 = 0$

b. $\cos^2(x) - 5 \cos(x) + 4 = 0, x \in [0, 2\pi]$

c. $\tan^2(x) - (1 + \sqrt{3})\tan(x) + \sqrt{3} = 0$

Question 14


Solve the following equations for x .

a. $2\sin^2\left(x + \frac{\pi}{3}\right) + \sin\left(x + \frac{\pi}{3}\right) - 1 = 0$

b. $\cos^2\left(2x - \frac{\pi}{4}\right) + 3 \cos\left(2x - \frac{\pi}{4}\right) + 2 = 0, x \in [-2\pi, 0]$

c. $\tan^2(\pi x) - 1 = 0, x \in [-1, 1]$

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Question 15

Solve the following equations for x .

a. $\cos^2\left(-2x + \frac{\pi}{6}\right) + 2 = 1 - 2\sin\left(-2x + \frac{2\pi}{3}\right)$

b. $\cos^2\left(\frac{3x}{2} - \frac{\pi}{2}\right) - 2\sin\left(\frac{3x}{2}\right) - 3 = 0, x > 0$

c. $\sin^2\left(x + \frac{\pi}{4}\right) - 2 \sin\left(x + \frac{\pi}{4}\right) + \cos^2\left(-\left(x + \frac{\pi}{4}\right)\right) = 0$

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