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VCE Mathematical Methods ½
Circular Functions I [4.1]
Homework

Admin Info & Homework Outline:
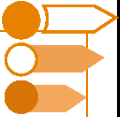
Student Name	
Questions You Need Help For	
Compulsory Questions	Pg 2-Pg 26

Section A: Compulsory Questions

TIP: Drawing a unit circle will really help!

Sub-Section [4.1.1]: Evaluating Exact Values for Sine, Cosine And Tangent

Question 1

Find:

a. $\sin\left(\frac{\pi}{3}\right)$

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b. $\cos(45°)$

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c. $\tan\left(\frac{\pi}{6}\right)$

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d. $\sin(150°)$

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e. $\cos\left(\frac{3\pi}{2}\right)$

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f. $\tan(225°)$

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Question 2

Find:

a. $\sin(10\pi)$

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b. $\cos(390°)$

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c. $\tan(-210°)$

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d. $\sin(-150°)$

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e. $\cos\left(-\frac{5\pi}{4}\right)$

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f. $\tan\left(\frac{15\pi}{4}\right)$

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Question 3 Tech-Active.

Find the value of the following expressions, giving your answer to 3 decimal places if an exact answer is not possible.

a. $\sin\left(\frac{\pi}{9}\right)$

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b. $\cos(742°)$

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c. $\tan\left(\frac{\pi}{12}\right)$

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d. $\sin(105°)$

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e. $\cos\left(-\frac{29\pi}{12}\right)$

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f. $\tan(111.3°)$

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Sub-Section [4.1.2]: Applying Identities to Evaluate Trigonometric Functions

Question 4

Given that $\sin(\theta) = \frac{3}{5}$ and θ is in the first quadrant, find:

a. $\cos(\theta)$

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b. $\tan(\theta)$

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Question 5

Given that $\cos(\theta) = -\frac{5}{13}$ and θ is in the third quadrant, find:

a. $\sin(\theta)$

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b. $\tan(\theta)$

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Question 6

A point P lies on the unit circle such that its y-coordinate is $\frac{4}{5}$ and it lies in the second quadrant. Let θ be the angle that the line segment between P and the origin makes with the positive direction of the x-axis.

a. State an interval (a, b), where $b - a = \frac{\pi}{2}$, that θ could fall into.

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b. Find $\sin(\theta)$.

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c. Hence, find $\cos(\theta)$.

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Question 7 Tech-Active.

Given that $\cos(\theta) = 0.4$ and θ is in the fourth quadrant, find:

a. $\sin(\theta)$

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_____

b. $\tan(\theta)$

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c. The coordinates of the point on the unit circle corresponding to the angle θ.

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Sub-Section [4.1.3]: Apply Supplementary and Complementary Relationships to Evaluate Trigonometric Functions

Question 8

Let $\sin(\theta) = \frac{3}{5}$, where θ is in the first quadrant.

Find:

a. $\sin(\pi - \theta)$

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b. $\cos\left(\frac{\pi}{2} + \theta\right)$

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c. $\tan(\pi - \theta)$

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Question 9

Let $\sin(\theta) = \frac{8}{17}$, where θ is in the second quadrant.

Find:

a. $\cos\left(\frac{\pi}{2} - \theta\right)$

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b. $\sin(\pi + \theta)$

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c. $\tan(-\theta)$

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Question 10

Let α be an angle in the third quadrant such that $\sin(\alpha) = -\frac{5}{13}$ and β be an angle in the second quadrant such that $\cos(\beta) = -\frac{4}{5}$.

Find:

a. $\sin\left(\frac{\pi}{2} - \alpha\right)$

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b. $\cos\left(\frac{\pi}{2} + \beta\right)$

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c. $\tan\left(\frac{\pi}{2} + \alpha\right) \tan\left(\frac{\pi}{2} - \beta\right)$

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Question 11 Tech-Active.

Let $\sin(\theta) = \frac{\sqrt{5}}{3}$, where θ lies in the second quadrant.

Find:

a. $\cos(\pi - \theta)$

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b. $\tan(-\theta)$

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c. $\cos\left(\frac{\pi}{2} - \theta\right)$

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Sub-Section [4.1.3]: Finding Particular Solutions for Trigonometric Functions

Question 12

Solve the following over the domain $x \in [0, 2\pi]$.

a. $\sin(x) = \frac{1}{2}$

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

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c. $\tan(x) = 1$

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d. $\sin(x) = -\frac{\sqrt{2}}{2}$

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e. $\cos(x) = \frac{\sqrt{2}}{2}$

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

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Question 13

Solve the following over the domain $x \in [0, 2\pi]$.

a. $2\sin(2x) - \sqrt{3} = 0$

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

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c. $-2\tan\left(4x + \frac{\pi}{6}\right) + 1 = 3$

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d. $2\cos\left(\frac{x}{2}\right) - \sqrt{2} = 0$

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

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f. $2\tan(5x) + 1 = 3$

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Question 14

Solve the following over the domain $x \in [-2\pi, 0]$.

a. $\sqrt{3}\sin(2x) + \cos(2x) = 0$

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

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Question 15 Tech-Active.

Solve the following over the domain $x \in [0, 2\pi]$, giving solutions to 3 decimal places.

a. $\sin(2x) + \cos(2x) = \frac{\sqrt{2}}{2}$

_____

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_____

b. $\sin\left(x - \frac{\pi}{12}\right) - \cos\left(3x + \frac{\pi}{4}\right) = \frac{\sqrt{3}}{4}$

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_____

c. $\tan^2\left(\frac{x}{3} + \frac{\pi}{16}\right) = 7$

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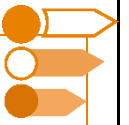
Sub-Section: The 'Final Boss'

Question 16

a. Find $\sin\left(\frac{\pi}{6}\right)$.

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b. Hence, using the Pythagorean identity, find $\cos\left(\frac{\pi}{6}\right)$.

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c. Given that $\tan(\theta) = \frac{5}{12}$ and θ lies in quadrant 3, find:

    i. $\sin(\theta)$

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    ii. $\cos(\theta)$

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    iii. $\sin\left(\frac{\pi}{2} - \theta\right)$

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iv. $\cos\left(\frac{\pi}{2} + \theta\right)$

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d. Solve $\sin(x) + 2\cos(x) + \cos(x)\tan(x) = 0$ over the interval $x \in [-\pi, \pi]$.

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