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VCE Mathematical Methods ¾
Circular Functions I [3.2]
Homework

Admin Info & Homework Outline:

Student Name	
Questions You Need Help For	
Compulsory Questions	Pg 02 - Pg 13
Supplementary Questions	Pg 14 - Pg 21

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Section A: Compulsory Questions

Sub-Section [3.3.1]: Finding Exact Values of Circular Functions
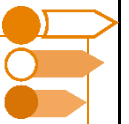
Question 1

Find the exact value of:

a. $\sin\left(\frac{\pi}{4}\right)$

_____

b. $\cos\left(\frac{\pi}{6}\right)$

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c. $\tan\left(\frac{\pi}{3}\right)$

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Question 2

Find the exact value of:

a. $\sin\left(\dfrac{3\pi}{2}\right)$

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b. $\cos\left(\dfrac{5\pi}{6}\right)$

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c. $\tan\left(\dfrac{5\pi}{3}\right)$

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Question 3

Find the exact value of:

a. $\sin\left(\dfrac{16\pi}{3}\right)$

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b. $\cos\left(\dfrac{26\pi}{3}\right)$

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c. $\tan\left(\dfrac{15\pi}{4}\right)$

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Question 4 Tech-Active.

Find the exact value of $\sin\left(\frac{\pi}{8}\right)$ in the form of $\frac{\sqrt{a-\sqrt{a}}}{2}$, for positive integer a.

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Sub-Section [3.3.2]: Applying the Pythagorean Identity and Symmetrical Properties

Question 5

Given that $\sin(x) = \frac{4}{5}$ and $0 < x < \frac{\pi}{2}$, find:

a. $\cos(x)$

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b. $\tan(x)$

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c. $\sin\left(x + \frac{\pi}{2}\right)$

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Question 6

Given that $\sin(x) = \frac{3}{5}$ and $\frac{\pi}{2} < x < \pi$, find:

a. $\cos(x)$

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b. $\tan(x)$

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c. $\cos\left(x - \frac{3\pi}{2}\right)$

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Question 7

Given that $\tan(x) = \frac{12}{5}$ and $-\pi < x < -\frac{\pi}{2}$, find:

a. $\sin(x)$

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b. $\cos(x)$

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c. $\sin\left(x + \frac{7\pi}{2}\right)$

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Question 8 Tech-Active.

Find $\sin(x) + \cos(y)$ if $\sin(y) = -\frac{8}{17}$ and $\cos(x) = \frac{12}{37}$, where $0 < x < \frac{\pi}{2}$ and $\frac{3\pi}{2} < y < 2\pi$.

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Sub-Section [3.3.3]: Finding Particular and General Solutions

Question 9

a. Solve $2\cos(x) = \sqrt{3}$ for $0 \le x \le 2\pi$.

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b. Solve $\sqrt{2}\sin(x) = 1$ for $0 \le x \le 2\pi$.

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c. Solve $4\tan(x) = 4$.

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Question 10

a. Solve $8\cos(3x) = 4$ for x.

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b. Solve $6\sin\left(2x + \frac{\pi}{3}\right) = 3$ for $-2\pi \leq x \leq 2\pi$.

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c. Solve $2\sin\big(3(x + \pi)\big) = 1$ for x.

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Question 11

a. Find the general solution to $2\cos\left(3x - \frac{\pi}{3}\right) = 1$, where $x \geq 0$.

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b. Find the general solution to $\sqrt{3}\tan\left(4x - \frac{\pi}{2}\right) = 3$, where $x \geq 0$.

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c. Find the general solution to $3\sin\left(2x - \frac{\pi}{4}\right) = \frac{3}{2}$, where $x \leq 0$.

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Question 12 Tech-Active.

Find the general solution to $2\cos\left(3x + \frac{\pi}{4}\right) = \sqrt{2}$.

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Sub-Section: The 'Final Boss'

Question 13

Let $f(x) = \sin(2x)$.

a. Write the function $g(x) = f\left(x - \frac{\pi}{4}\right) + f\left(x + \frac{3\pi}{4}\right) + f\left(x + \frac{9\pi}{4}\right)$ in terms of $\cos(2x)$ only.

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b. Find all values of a such that:

i. $f(x - a) = f(x)$

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ii. $f(x + a) = \cos(2x)$

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c. Find the general solution to $2f\left(x - \frac{\pi}{8}\right) = \sqrt{2}$.

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d. Solve the equation $2\sin^2(2x) + \sin(2x) = 1$ for $x \in [-\pi, \pi]$.

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Section B: Supplementary Questions

Sub-Section [3.3.1]: Finding Exact Values of Circular Functions

Question 14

Find the exact value of:

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

_____

b. $\cos\left(\frac{\pi}{4}\right)$

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

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Question 15

Find the exact value of:

a. $\sin\left(\frac{7\pi}{6}\right)$

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b. $\cos\left(\frac{4\pi}{3}\right)$

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c. $\tan\left(\frac{7\pi}{4}\right)$

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Question 16

Find the exact value of:

a. $\sin\left(\frac{19\pi}{6}\right)$

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b. $\cos\left(\frac{25\pi}{6}\right)$

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c. $\tan\left(\frac{17\pi}{4}\right)$

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Sub-Section [3.3.2]: Applying the Pythagorean Identity and Symmetrical Properties

Question 17

Given that $\sin(x) = \frac{5}{13}$ and $0 < x < \frac{\pi}{2}$, find:

a. $\cos(x)$

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b. $\tan(x)$

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c. $\sin\left(x + \frac{\pi}{2}\right)$

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Question 18

Given that $\sin(x) = \frac{7}{25}$ and $\frac{\pi}{2} < x < \pi$, find:

a. $\cos(x)$

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b. $\tan(x)$

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c. $\cos\left(x - \frac{3\pi}{2}\right)$

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Question 19

Given that $\tan(x) = \frac{8}{15}$ and $-\pi < x < -\frac{\pi}{2}$, find:

a. $\sin(x)$

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b. $\cos(x)$

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c. $\sin\left(x + \frac{7\pi}{2}\right)$

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Sub-Section [3.3.3]: Finding Particular and General Solutions

Question 20

a. Solve $3\cos(x) = \frac{3}{2}$ for $0 \le x \le 2\pi$.

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b. Solve $2\sin(x) = \sqrt{2}$ for $0 \le x \le 2\pi$.

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c. Solve $5\tan(x) = 5$.

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Question 21

a. Solve $6\cos(2x) = 3$ for x.

b. Solve $4\sin\left(3x + \frac{\pi}{4}\right) = 2$ for $-2\pi \le x \le \pi$.

c. Solve $2\sin\big(4(x + \pi)\big) = 1$ for x.

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Question 22

a. Find the general solution to $2\cos\left(2x - \frac{\pi}{4}\right) = 1$, where $x \geq 0$.

b. Find the general solution to $\sqrt{3}\tan\left(5x - \frac{\pi}{3}\right) = 3$, where $x \geq 0$.

c. Find the general solution to $4\sin\left(3x - \frac{\pi}{6}\right) = 2$, where $x \leq 0$.

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