

KFUPM PREP MATH PROGRAM
MATH002 – TERM 243

7.1 Recitation Exercises

1. Verify the following identities:

a) $\frac{\sin x + \cos x}{\sec x + \csc x} = \sin x \cos x$

b) $\frac{1}{\sec x + \tan x} + \frac{1}{\sec x - \tan x} = 2 \sec x$

c) $\frac{\cos^2 x + \tan^2 x - 1}{\sin^2 x} = \tan^2 x$

2. If $A = 2\sin^2(2x) + 2\cos^2(2x)$ and $B = 3[\sec^2(-x) - \tan^2(-x)]$ find $A + B$.

3. If $\frac{\sin x + \csc x \cos^2 x + 1}{\sec x \csc x - \tan x} = A \sec x + B \tan x$, find the value of $A + B$.

4. If $\alpha = \frac{\sin \theta}{1 - \cot \theta}$ and $\beta = \frac{\cos \theta}{1 - \tan \theta}$ then $\alpha + \beta =$

A) $\sin \theta + \cos \theta$.

B) $\sin \theta - \cos \theta$.

C) $\sec \theta + \csc \theta$.

D) $\sec \theta - \csc \theta$.

E) $\tan \theta + \cot \theta$.

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7.2 Recitation Exercises

1. Find the value of:

a) $\sin(-15^\circ)$.

b) $\cos\left(\frac{13}{12}\right)$.

c) $\tan\left(\frac{17\pi}{12}\right)$.

d) $\frac{\tan 70^\circ + \cot 10^\circ}{1 - \tan 80^\circ \cot 20^\circ}$

2. Verify the following identities:

a) $\cot(x + y) = \frac{\cot x \cot y - 1}{\cot x + \cot y}$

b) $\sin\left(\frac{3\pi}{2} + \theta\right) + \cos\left(\frac{3\pi}{2} - \theta\right) = -\sin \theta - \cos \theta$

3. If α and β are two angles in standard position with $\sin \alpha = \frac{4}{5}$, where $\frac{\pi}{2} < \alpha < \pi$, and $\cos \beta = \frac{-5}{13}$, where $\pi < \beta < \frac{3\pi}{2}$. Then the terminal side of $(\alpha + \beta)$ is in the quadrant(s):

A) *I*

B) *II*

C) *IV*

D) *I or II*

E) *II or III*

4. Graph the following function:

$$f(x) = \cos 2x + \sqrt{3} \sin 2x$$

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7.3 Recitation Exercises

1. Verify the following identities:

a) $\tan\left(\frac{x}{2}\right) + \cos x \tan\left(\frac{x}{2}\right) = \sin x$

b) $\frac{1+\sin 2x}{\sin 2x} = 1 + \frac{1}{2}\sec x \csc x$

2. If $A = 1 + \cos 4x$ and $B = \left(\frac{\tan x}{1-\tan^2 x}\right)^2$, then $AB =$

A) $\sin^2 x$.

B) $\sin^2 2x$.

C) $\frac{1}{2}\sin^2 2x$.

D) $\frac{1}{4}\sin^2 4x$.

E) $\frac{1}{2}\cos^2 x$.

3. $\tan\left[\frac{\sin^{-1}\left(-\frac{3}{5}\right)}{2}\right] =$

A) $\frac{1}{3}$

B) $-\frac{1}{3}$

C) 3

D) -3

E) $\frac{8}{3}$

4. $\sin\left[2\cos^{-1}\left(-\frac{4}{5}\right)\right] =$

A) $\frac{-24}{25}$

B) $\frac{-25}{24}$

C) $\frac{25}{24}$

D) $\frac{24}{25}$

E) $\frac{24}{7}$

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7.4 & 7.5 Recitation Exercises

1. Solve the following equations:

a) $2 \sin^2 \theta - 3 \sin \theta - 2 = 0, \theta \in [0, 2\pi).$

b) $\sin 2\theta + \cos \theta = 0, \theta \in [0, \frac{3\pi}{2}).$

c) $\tan \frac{\theta}{2} - \sin \theta = 0, \theta \in [-\pi, \pi].$

2. Find all the solutions of the equation

$$\sin x \tan x - \tan x + \sin x = 1, \theta \in [0, 2\pi).$$

3. Find the sum of all the solutions of the equation

$$2 \cos \theta \cos 3\theta + 2 \sin \theta \sin 3\theta = -\sqrt{2}, \theta \in \left[0, \frac{\pi}{2}\right]$$

4. The sum of all solution(s) of the equation $\sin x = \cos\left(\frac{x}{2}\right)$ in the interval $\left[0, \frac{3\pi}{2}\right)$ is

- A) π B) 3π C) $\frac{4\pi}{3}$ D) $\frac{\pi}{3}$ E) $\frac{8\pi}{3}$

5. The number of solution(s) of $\sec x - \sqrt{3} \csc x = \sec x \csc x, 0 \leq x < 2\pi$, is

- A) 1 B) 2 C) 3 D) 4 E) 5