

MHF4U1 - UNIT 7 – TRIGONOMETRIC IDENTITIES AND EQUATIONS
SUPPLEMENTARY REVIEW PROBLEMS

- 1) Express each of the following as a **single** trigonometric function. Simplify as much as possible.

a) $5 \sin \frac{\theta}{3} \cos \frac{\theta}{3}$ b) $\frac{1 - \tan^2 \frac{\theta}{2}}{2 \tan \frac{\theta}{2}}$

- 2) Determine the exact value of each of the following. You do not need to rationalize the denominators in your answers.

a) $\cos \frac{4\pi}{3}$ b) $\csc 135^\circ$ c) $\cos \frac{7\pi}{12}$ d) $\left(\sin \frac{\pi}{8} - \cos \frac{\pi}{8} \right)^2$

- 3) Let $\frac{\pi}{2} \leq a \leq \pi$ and $\pi \leq b \leq \frac{3\pi}{2}$. If $\sin a = \frac{4}{5}$ and $\cos b = -\frac{12}{13}$, find the exact value of $\cos(a - b)$.

- 4) Prove the following identities.

a) $\frac{\sin x \cos x}{\tan x} = 1 - \sin^2 x$ b) $\frac{\sin 2x}{\sin x} - \frac{\cos 2x}{\cos x} = \sec x$

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

- 5) Solve the following equations for $0^\circ \leq x \leq 360^\circ$. Round your answer to the nearest tenth of a degree.

a) $\csc x = 1.5124$ b) $\sin 3x = -0.5$ c) $\cos 2x = \sin x$

- 6) Solve the following equations for $0 \leq \theta \leq 2\pi$. Give exact solutions, where possible. Round approximate solutions to the nearest thousandth of a radian.

a) $\sin^2 \theta - 2 \sin \theta - 3 = 0$ b) $\sin \theta - 3 \sin \theta \cos \theta = 0$

- 7) Using the addition formula for cosine, derive the double angle formulas for cosine.

Answers

1) a) $\frac{5}{2}\sin\frac{2\theta}{3}$ b) $\cot\theta$

2) a) $-\frac{1}{2}$ b) $\sqrt{2}$ c) $\frac{1-\sqrt{3}}{2\sqrt{2}}$ d) $\frac{\sqrt{2}-1}{\sqrt{2}}$

3) $\frac{16}{65}$

5) a) $x = 41.4^\circ, 138.6^\circ$ b) $x = 70^\circ, 110^\circ, 190^\circ, 230^\circ, 310^\circ, 350^\circ$
c) $x = 30^\circ, 150^\circ, 270^\circ$

6) a) $\theta = \frac{3\pi}{2}$ b) $\theta = 0, \pi, 2\pi, 1.231, 5.052$