PreCalculus
PreTest: 5.1 – 5.3 *Work attached

Name Answer Key
Date 2/12, 2/13 **Block** 1A, 2B

All work and answers should be done on separate paper. Make sure your work is legible and all steps involved can be clearly followed.

In 1 – 5, simplify *complelety.*

1. $\dfrac{\sin\left[\left(\frac{\pi}{2}\right)-x\right]}{\cos\left[\left(\frac{\pi}{2}\right)-x\right]} = \cot x$

2. $(1-\cos^2 x)(\csc x) = \sin x$

3. $\dfrac{\sin(-x)}{\cos(-x)} = -\tan x$

4. $\cot x \sec x = \csc x$

5. $\cos^2 x(\sec^2 x - 1) = \sin^2 x$

In 6 – 9, verify the identity.

6. $(\tan^2 x + 1)(\cos^2 x - 1) = -\tan^2 x$

7. $\dfrac{\cos x}{1-\sin x} = \sec x + \tan x$

8. $\csc^4 x - 2\csc^2 x + 1 = \cot^4 x$

9. $\dfrac{\tan x}{\csc x} + \dfrac{\sin x}{\tan x} = \sec x$

Work may vary

In 10 - 13, find the general solutions to each equation.

10. $2\cos x + \sqrt{2} = 0$ $x = \frac{3\pi}{4} + 2n\pi, \ \frac{5\pi}{4} + 2n\pi$

11. $4\sin^2 x - 3 = 0$ $x = \frac{\pi}{3} + 2n\pi, \ \frac{2\pi}{3} + 2n\pi, \ \frac{4\pi}{3} + 2n\pi, \ \frac{5\pi}{3} + 2n\pi$

12. $2\sin^2 x - 3\sin x + 1 = 0$ $x = \frac{\pi}{6} + 2n\pi, \ \frac{5\pi}{6} + 2n\pi, \ \frac{\pi}{2} + 2n\pi$

13. $\sec^2 x - \tan x = 1$ $x = n\pi, \ \frac{\pi}{4} + n\pi$

In 14 - 15, find all solutions on the interval $[0, 2\pi)$. When necessary, round decimals to the nearest thousandth.

14. $4\sin 3x = 2\sqrt{3}$ $x = \left\{\frac{\pi}{9}, \frac{7\pi}{9}, \frac{13\pi}{9}, \frac{2\pi}{9}, \frac{8\pi}{9}, \frac{14\pi}{9}\right\}$

15. $5\tan^2 x + 8\tan x - 4 = 0$ $x = \{0.381, 3.522, 2.034, 5.176\}$

① $\frac{\sin\left[\frac{\pi}{2}-x\right]}{\cos\left[\frac{\pi}{2}-x\right]} = \frac{\cos x}{\sin x} = \cot x$

② $(1-\cos^2 x)(\csc x) = \sin^2 x\left(\frac{1}{\sin x}\right) = \sin x$

③ $\frac{\sin(-x)}{\cos(-x)} = \frac{-\sin x}{\cos x} = -\tan x$

④ $\cot x \sec x = \frac{\cos x}{\sin x} \cdot \frac{1}{\cos x} = \csc x$

⑤ $\cos^2 x\left(\sec^2 x - 1\right) = \cos^2 x \cdot \tan^2 x = \cos^2 x \cdot \frac{\sin^2 x}{\cos^2 x} = \sin^2 x$

⑥ $(\tan^2 x + 1)(\cos^2 x - 1) = -\tan^2 x$

$\sec^2 x\,(-\sin^2 x) =$

$\frac{1}{\cos^2 x} \cdot -\sin^2 x =$

$-\tan^2 x = -\tan^2 x$ ✓

⑦ $\frac{\cos x}{1-\sin x} = \sec x + \tan x$

$\frac{\cos x(1+\sin x)}{(1-\sin x)(1+\sin x)} =$

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

$\frac{\cos x(1+\sin x)}{\cos^2 x} =$

$\frac{1}{\cos x} + \frac{\sin x}{\cos x} =$

$\sec x + \tan x = \sec x + \tan x$ ✓

⑧ $\csc^4 x - 2\csc^2 x + 1 = \cot^4 x$

$(\csc^2 x - 1)(\csc^2 x - 1) =$

$(\cot^2 x)(\cot^2 x) =$

$\cot^4 x = \cot^4 x$ ✓

(9) $\frac{\tan x}{\csc x} + \frac{\sin x}{\tan x} = \sec x$

$\frac{\tan^2 x + \csc x \sin x}{\csc x \tan x} =$

$\frac{\tan^2 x + 1}{\csc x \tan x} =$

$\frac{\sec^2 x}{\frac{1}{\sin x} \cdot \frac{\sin x}{\cos x}} =$

$\frac{\sec^2 x}{\sec x} =$

$\sec x = \sec x$ ✓

(10) $2\cos x + \sqrt{2} = 0$

$\cos x = -\frac{\sqrt{2}}{2}$

$x = \frac{3\pi}{4} + 2n\pi, \ \frac{5\pi}{4} + 2n\pi$

(11) $4\sin^2 x - 3 = 0$

$\sin^2 x = \frac{3}{4}$

$\sin x = \pm\frac{\sqrt{3}}{2}$

$x = \frac{\pi}{3} + 2n\pi, \ \frac{2\pi}{3} + 2n\pi, \ \frac{4\pi}{3} + 2n\pi, \ \frac{5\pi}{3} + 2n\pi$

OR

$\frac{\pi}{3} + n\pi, \ \frac{2\pi}{3} + n\pi$

(12) $2\sin^2 x - 3\sin x + 1 = 0$

$(2\sin x - 1)(\sin x - 1) = 0$

$\sin x = 1/2 \qquad \sin x = 1$

$x = \frac{\pi}{6} + 2n\pi, \ \frac{5\pi}{6} + 2n\pi, \qquad \frac{\pi}{2} + 2n\pi$

(13) $\sec^2 x - \tan x = 1$

$1 + \tan^2 x - \tan x = 1 \qquad \tan x = 0 \qquad \tan x = 1$

$\tan^2 x - \tan x = 0 \qquad x = 0 + n\pi, \qquad \frac{\pi}{4} + n\pi$

$\tan x (\tan x - 1) = 0$

(14) $4\sin 3x = 2\sqrt{3}$

$\sin 3x = \frac{\sqrt{3}}{2}$ $\qquad \left\{ \frac{\pi}{9}, \ \frac{7\pi}{9}, \ \frac{13\pi}{9}, \ \frac{2\pi}{9}, \ \frac{8\pi}{9}, \ \frac{14\pi}{9} \right\}$

$3x = \frac{\pi}{3} + 2n\pi, \ \frac{2\pi}{3} + 2n\pi$

$x = \frac{\pi}{9} + \frac{2n\pi}{3}, \ \frac{2\pi}{9} + \frac{2n\pi}{3}$

(15) $5\tan^2 x + 8\tan x - 4 = 0$

$(5\tan x - 2)(\tan x + 2) = 0$

$\tan x = 2/5 \qquad \tan x = -2$

$x = 0.381 + n\pi \qquad x = 2.034 + n\pi$

$x = \{0.381, \ 3.522, \ 2.034, \ 5.176\}$