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M4

4-4 Practice ANSWERS

C Problems

$$\begin{aligned} 1.) &= \cos x (\cos^2 x + \sin^2 x) \\ &= \cos x (1) \\ &= \cos x \checkmark \end{aligned}$$

$$\begin{aligned} 2.) &= \frac{1}{\cos x} \cdot \sin x \\ &= \tan x \checkmark \end{aligned}$$

$$\begin{aligned} 3.) &= \frac{\tan^2 x}{\tan x} \\ &= \tan x \checkmark \end{aligned}$$

$$\begin{aligned} 4.) &= \frac{1}{\cos x} \cdot \sin x \cdot \frac{\cos x}{\sin x} \\ &= 1 \checkmark \end{aligned}$$

$$\begin{aligned} 5.) &= (1 - \sin^2 x) - \sin^2 x \\ &= 1 - 2\sin^2 x \checkmark \end{aligned}$$

$$\begin{aligned} 6.) &= \frac{1}{\tan x} + \frac{\tan x}{\tan x} \\ &= \cot x + 1 \checkmark \end{aligned}$$

$$\begin{aligned} 7.) &= \frac{\cos x}{\tan x} + \frac{\frac{\sin x}{\cos x}}{\frac{\sin x}{\cos x}} \\ &= \cot x + \frac{1}{\cos x} \\ &= \boxed{\cot x + \sec x} \end{aligned}$$

$$\begin{aligned} 8.) &= 1 - \sin x \cdot \cancel{\cos x} \cdot \frac{\sin x}{\cancel{\cos x}} \\ &= 1 - \sin^2 x \\ &= \cos^2 x \checkmark \end{aligned}$$

$$\begin{aligned} 9.) &= 1 - 2(1 - \cos^2 x) \\ &= 1 - 2 + 2\cos^2 x \\ &= -1 + 2\cos^2 x \\ &= 2\cos^2 x - 1 \checkmark \end{aligned}$$

$$\begin{aligned} 10.) &= \frac{\sin x \cot x + \cos x}{\sin x} \\ &= \cot x + \cot x \\ &= 2\cot x \checkmark \end{aligned}$$

B Problems

$$\begin{aligned} 11.) &= \frac{\sin x}{\frac{\cos x}{\sec^2 x}} \\ &= \frac{\sin x}{\cos x} \cdot \frac{\cos^2 x}{1} \\ &= \frac{1}{\cos x} \\ &= \sin x \cdot \cos x \checkmark \end{aligned}$$

$$\begin{aligned} 12.) &= \sin x \cdot \frac{\sin x}{\cos x} + \cos x \cdot \frac{\cos x}{\cos x} \\ &= \frac{\sin^2 x}{\cos x} + \frac{\cos^2 x}{\cos x} \\ &= \frac{\sin^2 x + \cos^2 x}{\cos x} \\ &= \frac{1}{\cos x} \\ &= \sec x \checkmark \end{aligned}$$



(2)

B Problems (cont'd.)

$$\begin{aligned}
 13.) &= \frac{\cos x(1+\sin x)}{(1-\sin x)(1+\sin x)} \\
 &= \frac{\cos x(1+\sin x)}{(1-\sin^2 x)} \\
 &= \frac{\cos x(1+\sin x)}{\cos^2 x} \\
 &= \frac{1+\sin x}{\cos x} \checkmark
 \end{aligned}$$

$$\begin{aligned}
 14.) &= \cos^2 x - (1 - \cos^2 x) \\
 &= \cos^2 x - 1 + \cos^2 x \\
 &= 2\cos^2 x - 1 \checkmark
 \end{aligned}$$

$$\begin{aligned}
 15.) &= \frac{1+\sin x}{(1-\sin x)(1+\sin x)} - \frac{1-\sin x}{(1-\sin x)(1+\sin x)} \\
 &= \frac{1+\sin x}{1-\sin^2 x} - \frac{1-\sin x}{1-\sin^2 x} \\
 &= \frac{1+\sin x - (1-\sin x)}{\cos^2 x} \\
 &= \frac{2\sin x}{\cos^2 x} \\
 &= 2 \cdot \frac{\sin x}{\cos x} \cdot \frac{1}{\cos x} \\
 &= 2\tan x \cdot \sec x \checkmark
 \end{aligned}$$

A Problems

$$\begin{aligned}
 16.) &= \frac{1}{1+\sin x} (1-\sin x) \\
 &= 1 - \sin x + \frac{1}{\sin x} - 1 \\
 &= \frac{1}{\sin x} - \sin x \cdot \frac{(\sin x)}{(\sin x)} \\
 &= \frac{1-\sin^2 x}{\sin x} \\
 &= \frac{\cos^2 x}{\sin x} \\
 &= \frac{\cos x}{\sin x}, \cos x \\
 &= \cot x \cdot \cos x \checkmark
 \end{aligned}$$

$$\begin{aligned}
 17.) &= \frac{1+\cos x}{\sin x + \sin x \cos x} \\
 &= \frac{1+\cos x}{\sin x (\cancel{\frac{1}{\cos x}} + 1)} \\
 &= \frac{1}{\sin x} \\
 &= \csc x \checkmark
 \end{aligned}$$



(3)

A Problems (cont'd.)

$$\begin{aligned}
 18.) &= \frac{1}{\frac{\cos x}{\sin x} - \frac{\sin x}{\cos x}} \\
 &= \frac{1}{\frac{\cos^2 x}{\sin x \cdot \cos x} - \frac{\sin^2 x}{\sin x \cdot \cos x}} \cdot \frac{\sin x \cdot \cos x}{\sin x \cdot \cos x} \\
 &= \frac{\sin x \cdot \cos x}{\cos^2 x - \sin^2 x} \\
 &= \frac{\sin x \cdot \cos x}{(1 - \sin^2 x) - \sin^2 x} \\
 &= \frac{\sin x \cdot \cos x}{1 - 2\sin^2 x} \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 19.) &= \sec^2 x \cdot \sin^2 x + \sin^2 x + 2\sin x \cos x + \cos^2 x - \sec^2 x \\
 &= \sec^2 x \cdot \sin^2 x - \sec^2 x + 2\sin x \cos x + 1 \\
 &= \sec^2 x (\sin^2 x - 1) + 2\sin x \cos x + 1 \\
 &= \sec^2 x (-\cos^2 x) + 2\sin x \cos x + 1 \\
 &= -1 + 2\sin x \cos x + 1 \\
 &= 2\sin x \cos x \quad \checkmark
 \end{aligned}$$

$$\begin{aligned}
 20.) &= \frac{1 + \frac{1}{\cos x}}{\frac{\sin x}{\cos x} + \frac{\sin x}{1}} \cdot \frac{\cos x}{\cos x} \\
 &= \frac{\cos x + 1}{\sin x + \sin x \cos x} \\
 &= \frac{\cos x + 1}{\sin x (1 + \cos x)} \\
 &= \frac{1}{\sin x} \\
 &= \csc x \quad \checkmark
 \end{aligned}$$



(4)

A Problems (cont'd.)

$$\begin{aligned}
 21.) &= (\csc^2 x - \cot^2 x)(\csc^2 x + \cot^2 x) \\
 &= (\csc^2 x + (\csc^2 x - 1)) \\
 &= \csc^2 x + \csc^2 x - 1 \\
 &= 2\csc^2 x - 1 \checkmark
 \end{aligned}$$

$$\begin{aligned}
 22.) &= \frac{1 + 2\sin x \cos x}{\sin x + \cos x} \cdot \frac{(\sin x + \cos x)}{(\sin x + \cos x)} \\
 &= \frac{(1 + 2\sin x \cos x)(\sin x + \cos x)}{\sin^2 x + 2\sin x \cos x + \cos^2 x} \\
 &= \frac{(1 + 2\sin x \cos x)(\sin x + \cos x)}{1 + 2\sin x \cos x} \\
 &= \sin x + \cos x \checkmark
 \end{aligned}$$

$$\begin{aligned}
 23.) &= \frac{(1 - \sin^2 x) + 3\sin x - 1}{(1 - \sin^2 x) + 2\sin x + 2} \\
 &= \frac{-\sin^2 x + 3\sin x}{-\sin^2 x + 2\sin x + 3} \\
 &= \frac{-\sin x(\sin x - 3)}{-(\sin^2 x - 3)(\sin x + 1)} \\
 &= \frac{\sin x}{\sin x + 1} \cdot \frac{\csc x}{\csc x} \\
 &= \frac{1}{1 + \csc x} \checkmark
 \end{aligned}$$

$$\begin{aligned}
 24.) &= \frac{1}{\sec x - \tan x} \cdot \frac{(\sec x + \tan x)}{(\sec x + \tan x)} \\
 &= \frac{\sec x + \tan x}{\sec^2 x - \tan^2 x} \\
 &= \frac{\sec x + \tan x}{1} \\
 &= \sec x + \tan x \checkmark
 \end{aligned}$$